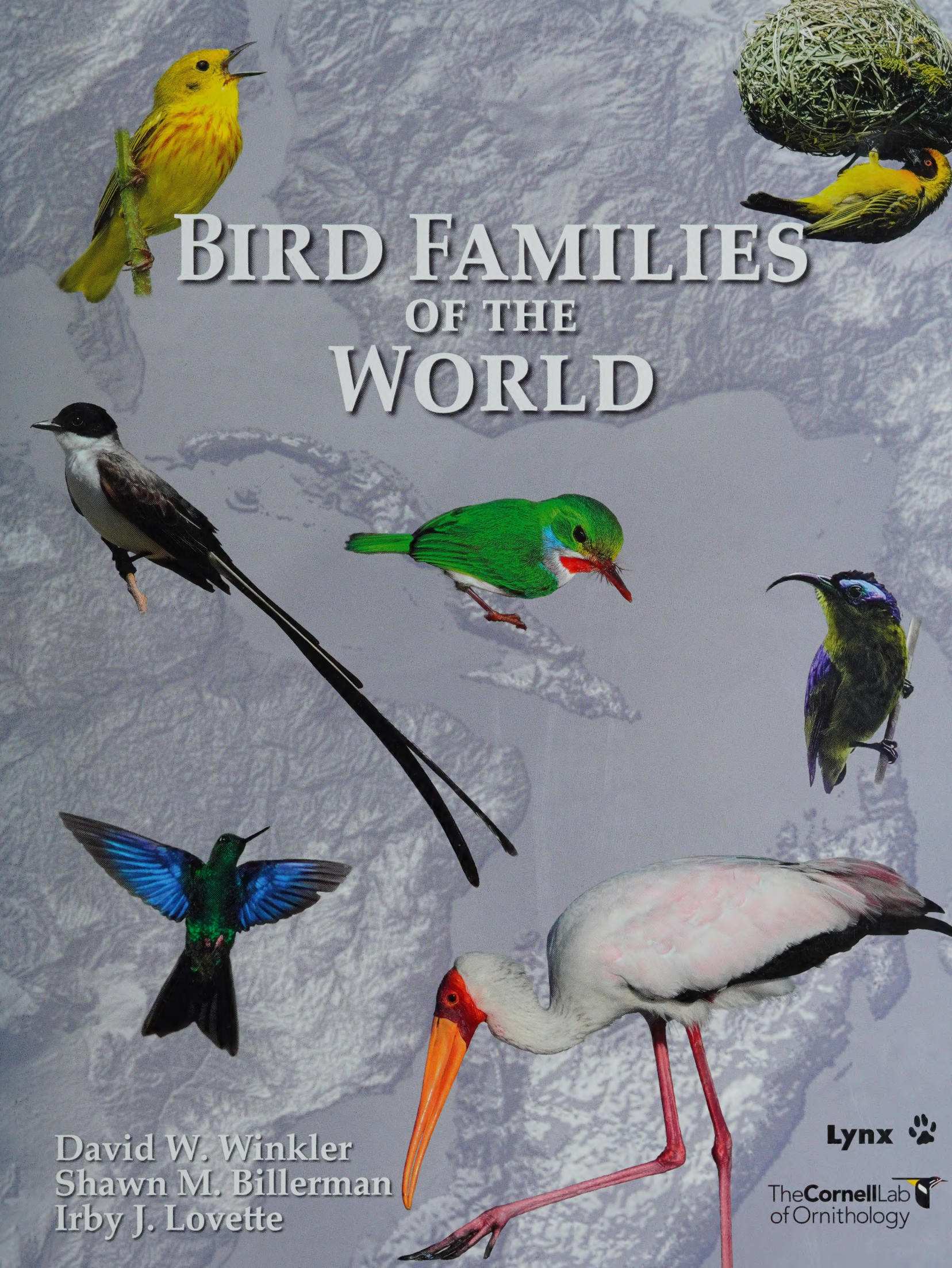


# Bird Families of the World

David W. Winkler
Shawn M. Billerman
Irby J. Lovette

Lynx

The Cornell Lab of Ornithology

## Back Cover:

**Center**:
Orange-footed Scrubfowl, *Megapodius reinwardt.*
Casuarina Coastal Reserve, Northern Territory,
Australia. © Con Foley.

**Clockwise from top center**:
Common Green Magpie, *Cissa chinensis.*
Kaeng Krachan NP, Thailand. © Alex Vargas.

Rail-babbler, *Eupetes macrocerus.*
Krung Ching, Thailand. © Francesco Veronesi.

Long-tailed Broadbill, *Psarisomus dalhousiae.*
Fraser's Hill, Pahang, Malaysia. © Con Foley.

White-winged Chough, *Corcorax melanorhamphos.*
Lake Cargellilo, New South Wales, Australia.
© Nevil Lazarus.

Magpie Goose, *Anseranas semipalmata.*
Mamukala Wetlands, Northern Territories, Australia.
© Con Foley.

Tickell's Blue Flycatcher, *Cyornis tickelliae.*
Kaeng Krachan NP, Thailand. © Francesco Veronesi.

Malay Banded Pitta, *Hydrornis irena.*
Si Phang-Nga NP, Thailand. © Francesco Veronesi.

## Front cover:

**Center**:
Cuban Tody, *Todus multicolor.*
Siboney Ecological Reserve, Cuba.
© Anay Serrano-Rodríguez

**Clockwise from top left**:
Yellow Warbler, *Setophaga petechia.*
Fairbanks, Alaska, USA. © Mark A. Chappell.

Southern Masked Weaver, *Ploceus velatus.*
Windhoek, Namibia. © Ken Behrens.

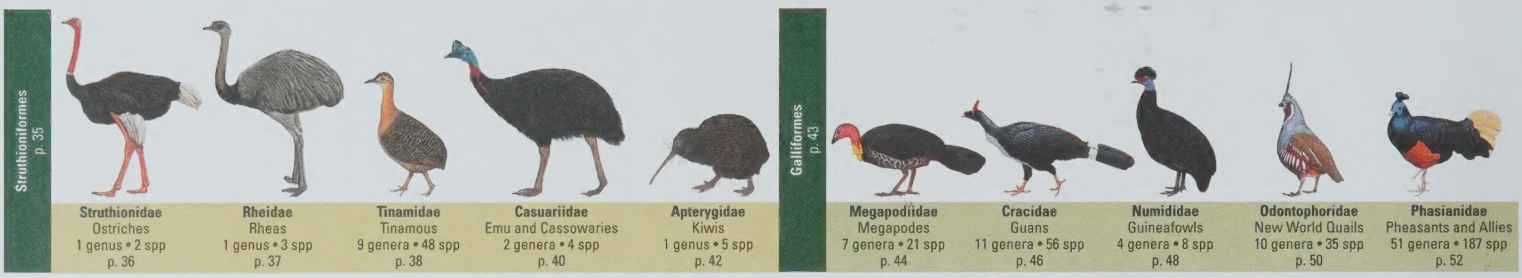
Common Sunbird-Asity, *Neodrepanis coruscans.*
Ranomafana NP, Madagascar. © Ken Behrens.

Yellow-billed Stork, *Mycteria ibis.*
Mida Creek Reserve, Kilifi County, Kenya.
© Piotr Jonczyk.

Great Sapphirewing, *Pterophanes cyanopterus.*
Yanacocha Reserve, Ecuador. © Dubi Shapiro.

Fork-tailed Flycatcher, *Tyrannus savana.*
Iguazú Falls, Brazil. © Piotr Jonczyk.

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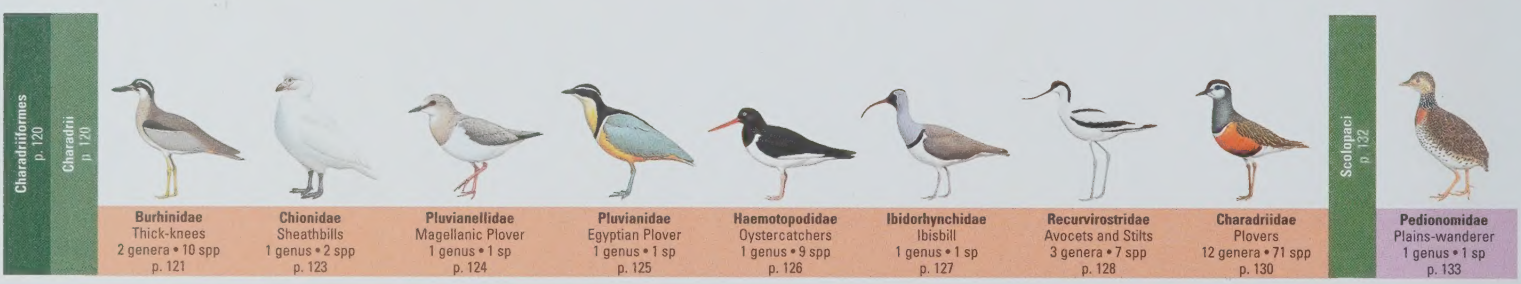
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**Rallidae** Rails and Coots
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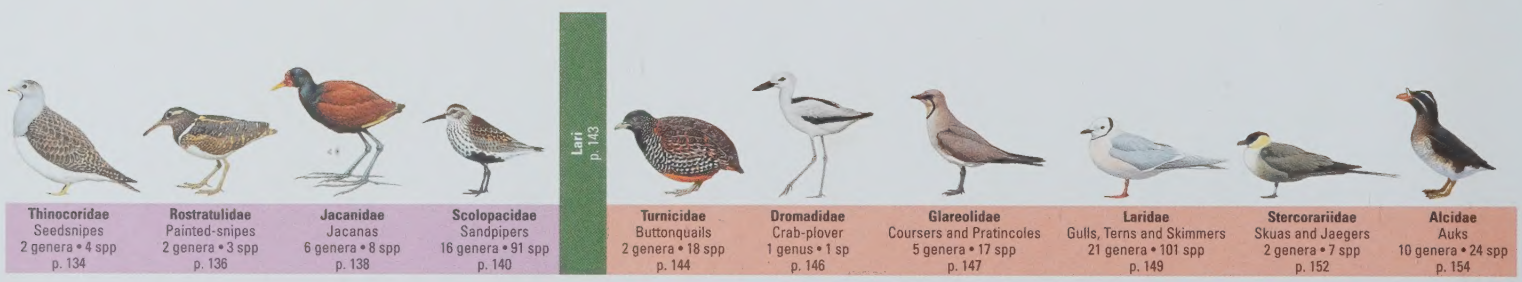
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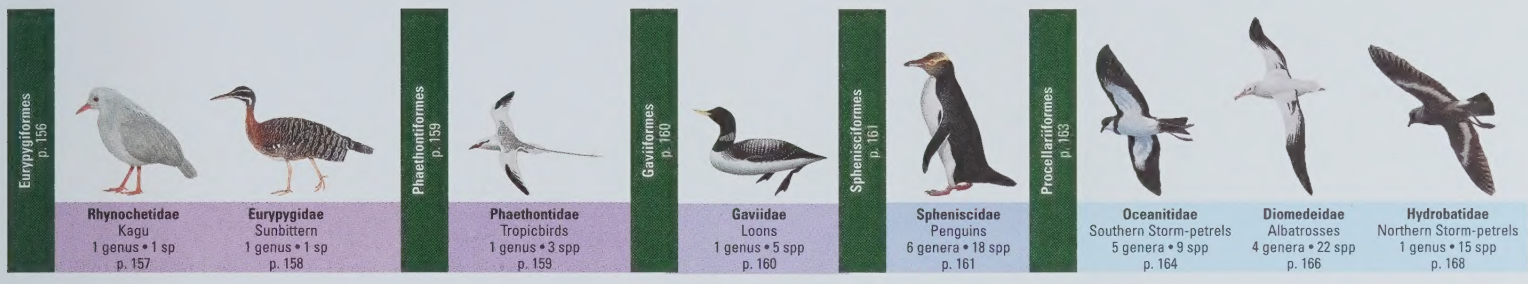
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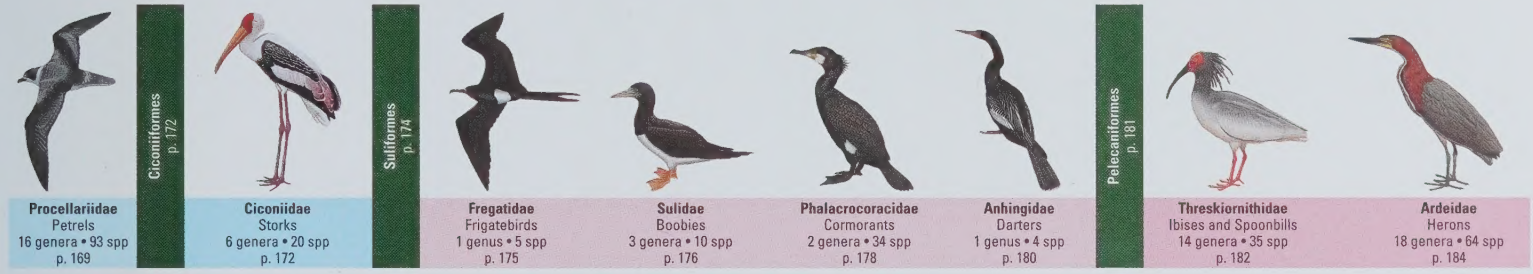
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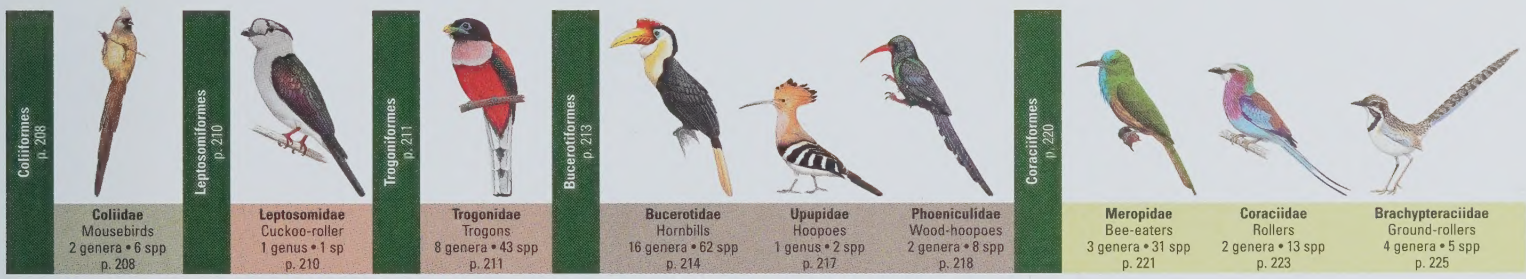
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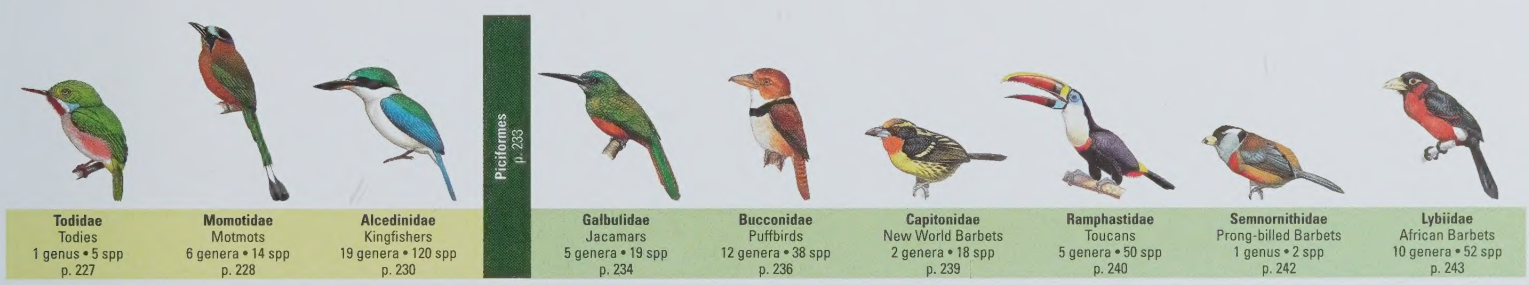
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# BIRD FAMILIES OF THE WORLD

## AN INVITATION TO THE SPECTACULAR DIVERSITY OF BIRDS

Lynx

The Cornell Lab of Ornithology

*For the students,*

*Who, despite the pell mell pressures around them,*

*Continue to be captivated and intrigued*

*By the deft efficiency of swifts,*

*The ethereal choruses of cranes,*

*And the elegant grace of an egret alighting on a limb.*

*Every new day brings the possibility of a new bird,*

*A new adventure,*

*And a new lesson.*

# BIRD FAMILIES OF THE WORLD

## AN INVITATION TO THE SPECTACULAR DIVERSITY OF BIRDS

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**Pedionomidae (Plains-wanderer)**: Lluís Sanz
**Thinocoridae (Seedsnipes)**: Ian Willis
**Rostratulidae (Painted-snipes)**: Francesc Jutglar
**Jacanidae (Jacanas)**: Hilary Burn
**Scolopacidae (Sandpipers)**: Francesc Jutglar, Etel Vilaró
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# Introduction

## Exploring the Spectacular Diversity of Birds

Many people are captivated by the variety of birds and the beguiling diversity of their songs and plumage, their odd variants in bills and feet, and the wondrous ways their behaviors are fitted to their environment. Observing birds is a life-enriching pursuit, in part because their sheer diversity means that there are always new and often bizarre birds to see and novel facets of their lives to explore. Unlike the majority of mammals, most birds are active and visible in the daytime. Like humans, birds rely on vision and vocalizations to gather information from their surroundings and communicate with others of their kind. This shared perceptual world may help us notice and study birds, but it does not immediately aid us in identifying or understanding them.

To explore avian diversity requires a mental map, a framework that helps us organize our experiences and observations. Fortunately, the scientific classification of birds provides exactly this type of organizational tool, grouping together species that are most closely related to one another into genera, families, and orders and thereby linking species that share remarkable or distinguishing traits.

You might return from a trip to a distant land with a memory of a bird with beautiful plumage or exotic behavior. You may wonder: Why was it colored that way, or behaving so bizarrely? What kind of bird was it, where did it come from, what other birds are most like it? Or perhaps you are an experienced ornithologist, but you are not yet totally familiar with the grand diversity of birds of the world. Or you have seen lots of species worldwide and want to stay up to date on how the different groups are related to one another. No matter your background or the reasons for your interest in avian diversity, we hope that this book can take your knowledge a step further by serving as a reference guide and learning tool for understanding both the evolutionary diversity of the world's birds and their great variation in appearance, ecology, and behavior.

This book has been informed and motivated by Winkler's experience over the past quarter century teaching an intensive Birds of the World segment of the advanced ornithology course at Cornell University. In that course, a combination of lectures, slides, and museum specimens is used to teach students to recognize all families of birds by exploring many of the biological details that make each avian group unique or notable. Future ornithologists obviously benefit from learning bird families of the world, for, as detailed below, this level of knowledge is the most serviceable framework for organizing their expanding knowledge of avian diversity throughout their careers. But non-ornithologist alumni of the course also testify how their knowledge of bird families made their first visit to a foreign land far more meaningful. Being able to get off a plane anywhere in the world and immediately recognize birds and know something about their biology is an empowering and synthesizing experience.

It is this more general benefit of understanding avian diversity that motivated us to compile this material into a single volume. We hope it will interest anyone with a keen interest in birds. Experienced birders know that an essential step in navigating an unfamiliar avifauna is assigning a newly seen bird to the correct family. Without a basic knowledge of bird families and their distributions, a newly arrived birder is often cursed with the frustration of leafing slowly through a field guide while the mysterious bird of interest disappears into the vegetation. In advance of a birding trip to a new habitat or continent, savvy birders review the families they are likely to encounter before considering the more subtle variations among individual species. For example, a birder visiting Asia or Australia for the first time might naturally be misled by the swallow-like birds they see sitting on telephone wires, unless they knew already about the woodswallows (Family Artamidae), which are only distantly related to the swallows (Family Hirundinidae) and usually found in a different section of a field guide.



**Figure1**. One of the fascinating rewards of learning your bird families is that you become aware that many birds that look and act alike are not at all closely related. These woodswallows (Left: White-breasted Woodswallow, *Artamus leucorynchus*, Bowra Station, Cunnamulla, Queensland, Australia, © Nevil Lazarus) feed on flying insects and, like swallows, have a broad mouth and long wings (Right: Violet-green Swallow *Tachycineta thalassina*, Lindo Lake, California USA, © Christopher L. Wood ), but the families to which they belong, Artamidae and Hirundinidae, respectively, are actually quite distantly related.

A final impetus for this book came from our admiration for the recent and ongoing work of our many scientific colleagues who conduct research on the evolutionary relationships of birds. For many years, our collective knowledge of avian evolution has been improving at an accelerating pace. However, most of the recent large-scale analyses conducted on all or most of the comprehensive avian "tree of life" are resulting in far more consensus than debate. We are finally able to frame the relationships of the majority of the world's most unusual bird species, as they have been included in detailed and modern evolutionary trees based on genetic data. Thus, we are publishing at what we hope is a propitious time, and we are optimistic that the hypotheses of relationships we summarize here can form the basis for a classification and recognition of groups that may last more than a few years.

In any event, too many of the fascinating recent findings on bird evolutionary relationships are hidden from public view in highly technical scientific papers. In gathering information on each avian order and family, we have here tried to review and incorporate all relevant scientific studies on avian relationships published up through December 2014. Interesting papers continued to appear in 2015 as we finalized this book, but we cite only one paper from this period because it placed a species we referenced in a different family. For interested readers, the "Relationships" sections of each account contain formal citations to the necessary papers, making this book relevant also to professional biologists who want to update themselves on these findings. Note also that the Literature Cited section near the end of the book contains the full citations for each of these works as well as a Digital Object Identifier (DOI) whenever we could find one to give the reader ready access to this literature over the internet.

## Organizing the Diversity

This book is meant both as a general reference guide and as an aid to organizing your understanding of worldwide avian diversity at the level of families and orders. As part of that learning process, it is useful to understand some of the basic ways birds are classified, along with a few of the technical terms used by avian systematists. Systematics is the scientific study of the diversity of organisms and the relationships between them, and systematists have thought long and hard about things that most of us just take for granted. As you review this section, we hope you will learn the answers to two basic questions: How are birds divided into families, orders, and other levels of categorical rank? And why is this classification system valuable to everyone who is interested in Earth's great variety of bird life?

There are 36 orders and 243 families of living birds under the classification used in this book. If your goal is to become familiar with worldwide avian diversity, this is a daunting yet enticing number of groups to explore. Fortunately, this clustering of the world's 10,000-plus bird species into a much smaller number of orders and families provides a ready-made framework for organizing your knowledge. Classification at the level of orders provides the deep structure for avian diversity, sometimes revealing surprising relationships between families. For example, it is not intuitive that swifts and treeswifts (Families Apodidae and Hemiprocnidae) and hummingbirds (Family Trochilidae) are each other's closest relatives. And it is perhaps surprising that they in turn are most closely related to the odd owlet-nightjars (Family Aegothelidae) of Australasia. The placement of all four of these families in the same order is a tip-off, however, to their evolutionary affinity (Figure 2). Every time that we learn of a non-intuitive affinity such as this, we are encouraged to look closer. In this case, examination reveals shared derived characters in anatomy as well as an uncommon flexibility in thermoregulatory behavior: many of the species in this larger Order Caprimulgiformes have incorporated torpor (regulation of body temperature at a level substantially below normal active body temperatures) into their daily and annual routines as a way to conserve energy.

Traditionally, morphological characters were used to construct hypotheses about the relationships of birds, but now, with most analyses based on molecular data, the hypotheses of relationship that result are being used as a framework for turning the focus back on the evolution of morphology and all other aspects of avian structure and function, behavior, and ecology. This tremendous diversity in the properties of birds is most cogently summarized in bird families: the level of the avian family is where the diversity of birds becomes most manageable and meaningful. If there were many more families than 243, we would soon lose the capacity to manage them in our minds. If there were many fewer, then individual families would lump together birds with highly disparate traits and behaviors.

It is no accident that the family level is the most relevant and useful for making generalizations about the biology of particular avian groups: ornithologists have long been defining families for just this purpose. The birds within each family share a suite of traits, some of which are likely unique to that family. By learning the distinguishing features of each family, we gain a way to evaluate new information about its birds, essentially creating a mental filing system where these generalities are stored for easy retrieval in the future. Each new fact can be compared with what we would expect for a bird in that family. If it fits, we support the generalization. Alternatively, we may encounter birds that are outliers, having at least some traits that do not match those of the other birds in their family. Sometimes these exceptions result from special instances of evolutionary novelty, but sometimes they are indications that these birds are only distantly related to the other members of their family. Many of the recent discoveries about avian relationships have served to correct the placement of such "oddball" birds, either by moving them into other families or, if the genetic affinity is no closer to one family than another, by creating a new family for that bird.

Learning about the world's families of birds has practical and intellectual benefits. We have already mentioned how knowledge of the families of birds makes it much more efficient and enjoyable to learn the birds in a new locality. A familiarity with worldwide avian diversity is also enriching when we stay close to home. To really understand birds and all the adaptive solutions that they have inherited to deal with their various environments, we need to know about birds that do not live in our backyards, and that we may never see ourselves. Learning about birds on the other side of the world helps bring perspective to the birds we see at home, reminding us of how small a slice of the avian radiations of Earth we get to experience on a daily basis, and of the importance of acting in ways that help preserve this fascinating variety of creatures. And the global perspective on avian diversity that knowledge of bird families provides gives biologists and ecologists an invaluable whole-planet perspective on the faunas of the distinct biogeographic regions and the diverse processes that likely led to these regional differences.

## The Classification of Birds: A Primer

Since the late 1700's, most zoologists have used a standard set of conventions for classifying birds and other organisms. This Linnaean System is named after Carl Linnaeus, the Swedish botanist and zoologist who initially devised and popularized it. In the Linnaean system of classification, each bird is assigned to a set of hierarchically ranked categories. Table 1 below illustrates how this system is used to classify the House Sparrow, a species native to Eurasia that is now a familiar resident of most urban areas around the world.

In the scientific literature and in some field guides the House Sparrow is typically referred to by its scientific name *Passer domesticus*. This binomial ("two name") designation gives its genus and species names. Every binomial name is unique to a particular species: many different species can




**Figure 2**. Hypotheses about the relationships among birds have been revised substantially by the rise of molecular phylogenetics. Not only has modern data indicated repeatedly that swifts and hummingbirds are closest relatives to nightbirds such as nightjars and owlet-nightjars, but recent work indicates that owlet-nightjars are closer to swifts and hummingbirds than they are to the other night birds. Thus, if we want our taxonomic groups to reflect evolutionary relationships, we need to include all these families in one order. Inspection of such groups, combined from previously disjunct groups, often reveals commonalities in biology, in this case thermoregulatory physiology, that were not appreciated as such earlier. (Photos: **A**: Trochilidae, Sword-billed Hummingbird, *Ensifera ensifera*, Yana Cocha, Ecuador. © G.B. Baker; **B**: Apodidae, Fork-tailed Palm Swift, *Tachornis squamata*, Mitú, Vaupés, Colombia. © Ian Davies; **C**: Hemiprocnidae, Whiskered Treeswift, *Hemiprocne comata*, on nest, Danum Valley, Sabah, Borneo. © D.W. Winkler; **D**: Aegothelidae, Australian Owlet-nightjar, *Aegotheles cristatus*, Atherton Tablelands, Queensland, Australia. © Daniel Gu; **E**: Caprimulgidae, Malay Eared Nightjar, *Lyncornis temminckii*, on nest, Johor, Malaysia. © Con Foley).

**Table 1**. Linnaean classification of the House Sparrow

| Category | Taxonomic Name | Context |
|---|---|---|
| Kingdom | Animalia | all animals |
| Phylum | Chordata | all animals with backbones |
| Class | Aves | all birds, living and extinct |
| Order | Passeriformes | all "songbirds," 137 families; over 5,000 species |
| Family | Passeridae | comprises *Passer* and 7 other genera |
| Genus | Passer | 26 species in the genus *Passer* |
| Species | domesticus | 1 of the 10,000+ living bird species |

have the same species or genus name, but only one species can have its distinct combination of both. The genus groups all the most closely related species under one name; in this case, it indicates that the House Sparrow is most closely related to the many other sparrow species that are also placed in the genus *Passer*, such as the Eurasian Tree Sparrow *Passer montanus*, and 24 others.

There are many variants on this general hierarchical system, some of which are presently used by many (but not all) ornithologists who study the evolutionary relationships of birds. Some avian systematists divide Orders successively into Suborders, Infraorders, and Parvorders. Families are also sometimes grouped together into Superfamilies, and they are often subdivided into Subfamilies, and then Subfamilies into Tribes. In this book, we sometimes will refer to the ranks of parvorder (with names ending in –ida) and superfamily (with names ending in –oidea). These and other variants can be confusing even to specialists, but it helps to remember that they all adhere to a common principle: as you move from the broadest grouping (Kingdom) down to the smallest group (Species or Subspecies), each finer level is nested within those above it. As we will see, the nesting in this classification system turns out to be both scientifically mandatory and exceedingly useful to people trying to organize their understanding of worldwide avian diversity.

This book covers avian diversity at the classification levels of orders and families. The names of orders can be recognized by their standard ending –iformes, as in Passeriformes, the order that comprises all songbirds. Here, we recognize 36 orders of living birds. The names of families can also be recognized by the standard ending –idae, as in Passeridae, the family that includes the House Sparrow. Here, we recognize 243 families of living birds.

## Phylogenies and Avian Classification

To see why the hierarchical classification makes such good biological sense, it is necessary to have a basic understanding of how evolutionary trees can be used to depict the history and relationships of birds. Such trees—technically termed phylogenies, or phylogenetic trees—underlie modern avian classification at all levels.

### *Making Sense of Evolutionary Trees*

Phylogenies are diagrams that represent the threads of relationships among organisms, summarizing the pattern of their evolutionary history. Although they can be drawn in many ways, all phylogenies share two fundamental components. First, in some dimension they reflect time. Second, they all have a branching structure that depicts the order in which the various evolutionary lineages split from one another.

It is easier to understand how phylogenetic trees work in reference to a real example. Consider the phylogeny of a subset of the Order Passeriformes depicted in Figure 3. In this case the time dimension runs from left to right, with more ancient relationships branching to the left and more recent events branching to the right. As drawn here, this axis is not directly proportional to actual time, but in general you know that you are moving from earlier to later divergences as you move from left to right across this tree.

This phylogeny also has a branching structure that shows the relationships among the various living groups in this assemblage of songbirds. Each line in the tree depicts an evolutionary lineage. You can see that this branching structure increases steadily in complexity as you move toward the present, with older lineages splitting at various times into two (or sometimes more) descendant lineages. The most important thing to remember about the branching structure of a phylogenetic tree is that it shows the order in which groups have split from their common ancestor.

Phylogenies are simplified versions of a much more complex history. The phylogenies we are concerned with in this book treat groups at the family level. Thus, for instance, Figure 3 does not include the more intricate branching that connects the thousand-plus species within these families. More fundamentally, phylogenies based on molecular data include only the lineages that have survived to the present. These trees exclude the many lineages that have become extinct since the origin of each group in them. We will likely never discover the complete history of all extinct avian lineages because the fossil record of birds, with their generally lightweight and fragile skeletons, is woefully incomplete.

It is always important to remember that every phylogeny is just a working hypothesis about how the sequence of evolutionary branching progressed in the past. Such hypotheses change as we discover new information and develop better tools for analysis. We must therefore content ourselves with knowing that our hypotheses about the branching history of modern birds are steadily being revised and improved as our samples grow richer and our methods for reconstructing phylogenetic relationships of birds become ever more sophisticated. The phylogenetic relationships presented in this book are hypotheses that in our judgment are most consistent with the available evidence. As more evidence is uncovered, these hypotheses will continue to be revised. Such changes can be frustrating because they require us to steadily revamp our thinking about avian taxonomy, but on the positive side, they stem from our rapidly improving knowledge about the evolutionary history of birds.

The evolutionary path of diverging lineages that gives phylogenies their branching structure is fundamental to the way we classify birds into higher categorical ranks like genera, families, and orders. An inviolate rule of modern phylogeny-based classification is that each formally named group must include all lineages that descend from its common ancestor. This means that every bird in a particular taxonomic group—be it a genus, family, or order—is more closely related to all other birds in that same group than it is to any other known birds, living or extinct. An advantage of this tenet is that if you know how a particular bird is classified, you already know a lot about its evolutionary relationships to other birds.

In the technical language of systematics, this principle stems from the motivation of basing classification on **monophyletic groups**, those that include an ancestor and all of its descendants. The term **clade** is a commonly used synonym for monophyletic group. In any phylogenetic tree, clades are embedded within one another. For example, in Figure 3, a cluster of four families (Pipridae, Tyrannidae, Tityridae, and Cotingidae) forms one clade. Because the Pipridae branched off earliest within this clade, the remaining three families (Tyrannidae, Tityridae, and Cotingidae) also form a smaller clade within the larger, more inclusive one. Likewise the two most closely related families (Tityridae and Cotingidae) form yet another even smaller clade, and each family is a clade of the

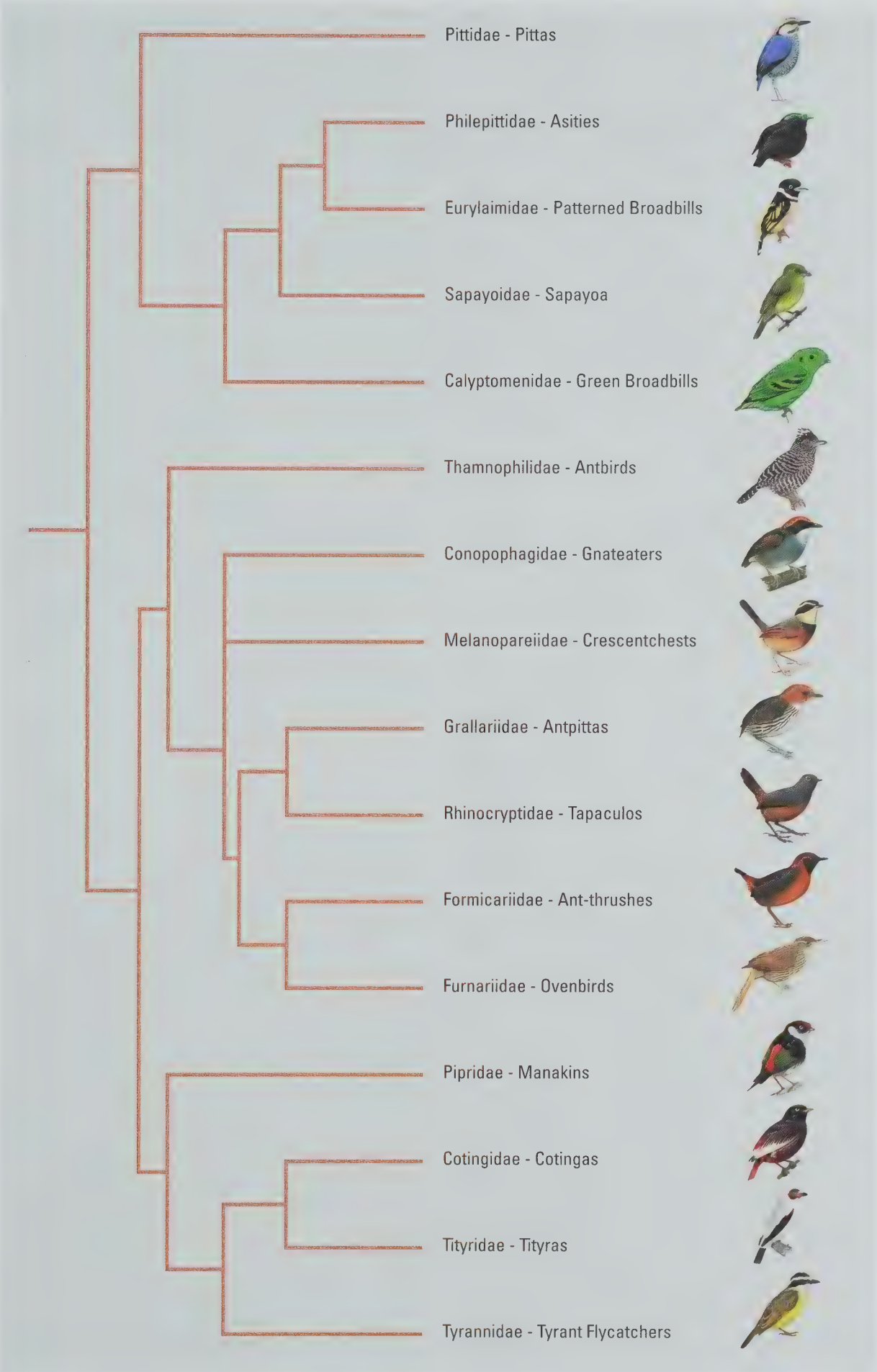



**Figure 3**. A phylogenetic hypothesis for relationships among the families of suboscine passerines (after Chesser 2004, Moyle *et al.* 2006a, Irestedt *et al.* 2006a, Tello *et al.* 2009).

genera contained within. In contrast, a group that included only the Tyrannidae and Pipridae would not be considered a clade, because it violates the criterion of **monophyly**: it would exclude some of the known descendants of the common ancestor of the Tyrannidae and Pipridae.

These three terms from systematics—monophyletic, monophyly, and clade—are basically unavoidable when discussing the current classification of birds, and we use them frequently in the Relationships sections of this book. Groups separated by fewer branching events are more closely related. Pairs of taxa that are connected by a single branching point between them are most closely related, and we call these pairs **sister groups**. For example, the tityras (Tityridae) and cotingas (Cotingidae) in Figure 1 are represented as sister taxa, and they are more closely related to each other than they are to the tyrant flycatchers (Tyrannidae). It is for this reason that, whenever we are sufficiently convinced that a sister relationship with another family is strongly indicated by the available data, we list the sister family alone in the list of Related Families in the family accounts (see below).

Note also that, under the hypothesis of relationships presented in Figure 3, Sapayoidae has a sister relationship not with a single family but with a clade made up of two families, Philepittidae and Eurylaimidae: it is no closer to one of these than the other, and both Philepittidae and Eurylaimidae are included in the list of Related Families in the family account for Sapayoidae. In that same region of the tree, notice that the five families that cluster together at the top of the diagram (Pittidae, Calyptomenidae, Sapayoidae, Philepittidae, Eurylaimidae) are all more closely related to each other than they are to any of the other groups depicted elsewhere in this tree. This group of lineages forms a monophyletic clade that we call the Old World Suboscines.

Note that not all branches in a phylogenetic tree need be simple two-way splits. Sometimes, our knowledge of relationships among taxa is such that it is not possible to render the phylogeny as a simple split of one lineage into two. Accordingly, some sister relationships are so poorly known that a **polytomy** needs to be posited, a situation where it is possible that more than two lineages arose at the same time from the same ancestor or that relationships are insufficiently well understood to know which of several taxa diverged first. Such a polytomy occurs in Figure 3, where it is unclear whether a large clade made up of four families (Grallariidae, Rhinocryptidae, Formicariidae, and Furnariidae) is sister to Melanopareiidae or to Conopophagidae. It is likely that this polytomy will be resolved by further analyses in the future, but for now, we need to accept the polytomy as the most precise hypothesis of relationships currently available.

One of the challenges when we take the complex hierarchical structure of a phylogenetic tree and reduce it to the linear order in which the families are presented in this book is that a phylogenetic tree implies many equally accurate linear arrangements of the taxa it contains. For example, if we look at the families included in Figure 3, we could list them from top to bottom or bottom to top, and both listings of taxa would be equally faithful to the tree. But it is much more complicated than that. We could reorder the taxa in Figure 3, without violating the hierarchical ordering that its tree implies, as long as the sequence of branching is retained. To see this, consider for a moment the clade at the top of Figure 3, the one we referred to above as the Old World Suboscines. There are many possible rearrangements of the taxa in that clade (Figure 4), all of which would retain the hierarchical relations among the taxa, but each producing a different linear ordering of them. Systematists often refer to each of the branching points in a phylogeny as "nodes," and these different arrangements of taxa can easily be achieved by merely "spinning the nodes," rotating the tree structure around different nodes in the tree to produce different ordering of the taxa. In the linear order of families used in this book, we have generally tried to present the families in order from the earliest branching to the most recent (as in Figure 4A), but many possible orderings can be consistent with what is known of the tree. All that is really important in any linear ordering of taxa taken from a tree is that sister taxa be listed adjacent to each other, and that successively sister taxa are listed next in order.

There is one more aspect of trees that we need to discuss, because it helps to explain a term we have used to refer to two groups of passerines. If one looks at large phylogenies of organisms, one often sees different parts of the tree having distinctively different shapes. For example, if one looks at a tree from the recent analysis of the nine-primaried oscines by Barker *et al.* (2013) one sees (Figure 5) that the earlier divergences in the group are often very one-sided in their representation in extant taxa. That is, one branch is represented by a single family, and the other branch includes all the rest of the families in the group. Thus, in Figure 5, Motacillidae is sister to all the other families, Fringillidae is sister to all the other families but Motacillidae, etc. This situation continues into the nine-primaried oscine tree for many branches, with each branch bearing a single family that is sister to all the rest of the families that diverged after it. This is known as an unbalanced or "ladderized" tree (Crisp &

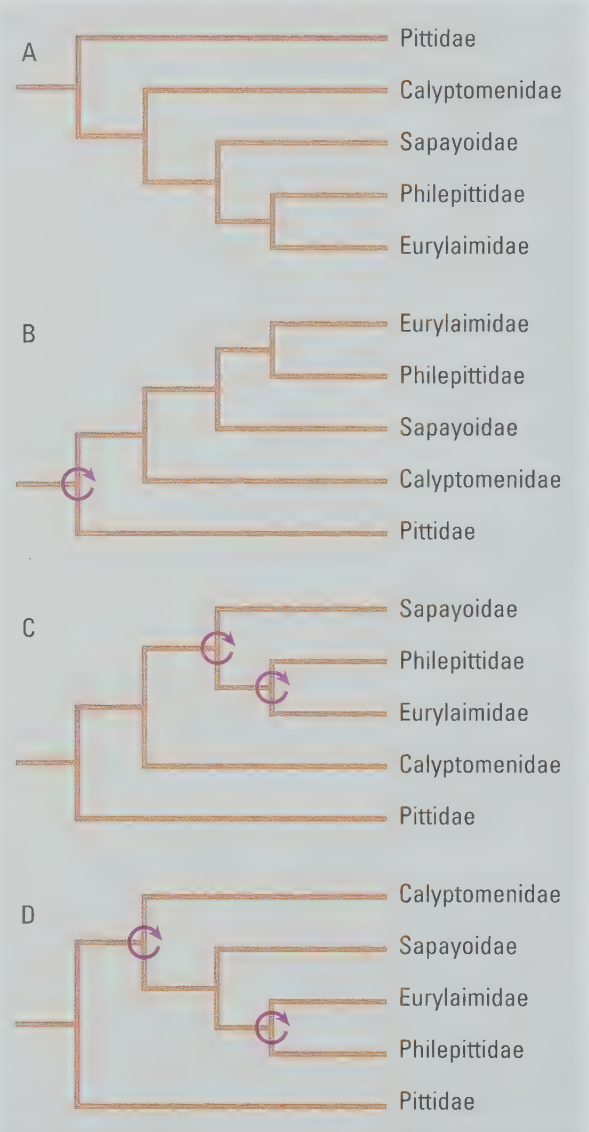



**Figure 4.** An example of how the same phylogeny can produce very different linear ordering of the taxa it contains. The phylogeny of Old World Suboscines (A) can be rearranged to produce the arrangement of taxa in B by "spinning the node" indicated by the circular purple arrow. Similarly, the arrangement in B can produce the arrangement in C by spinning the nodes indicated from B, and the arrangement in tree D can be produced from tree C by spinning the indicated nodes. Note that all of these are the same phylogenetic tree showing identical branching relationships among taxa, only the ordering of taxa along the right edge of the tree has been changed.

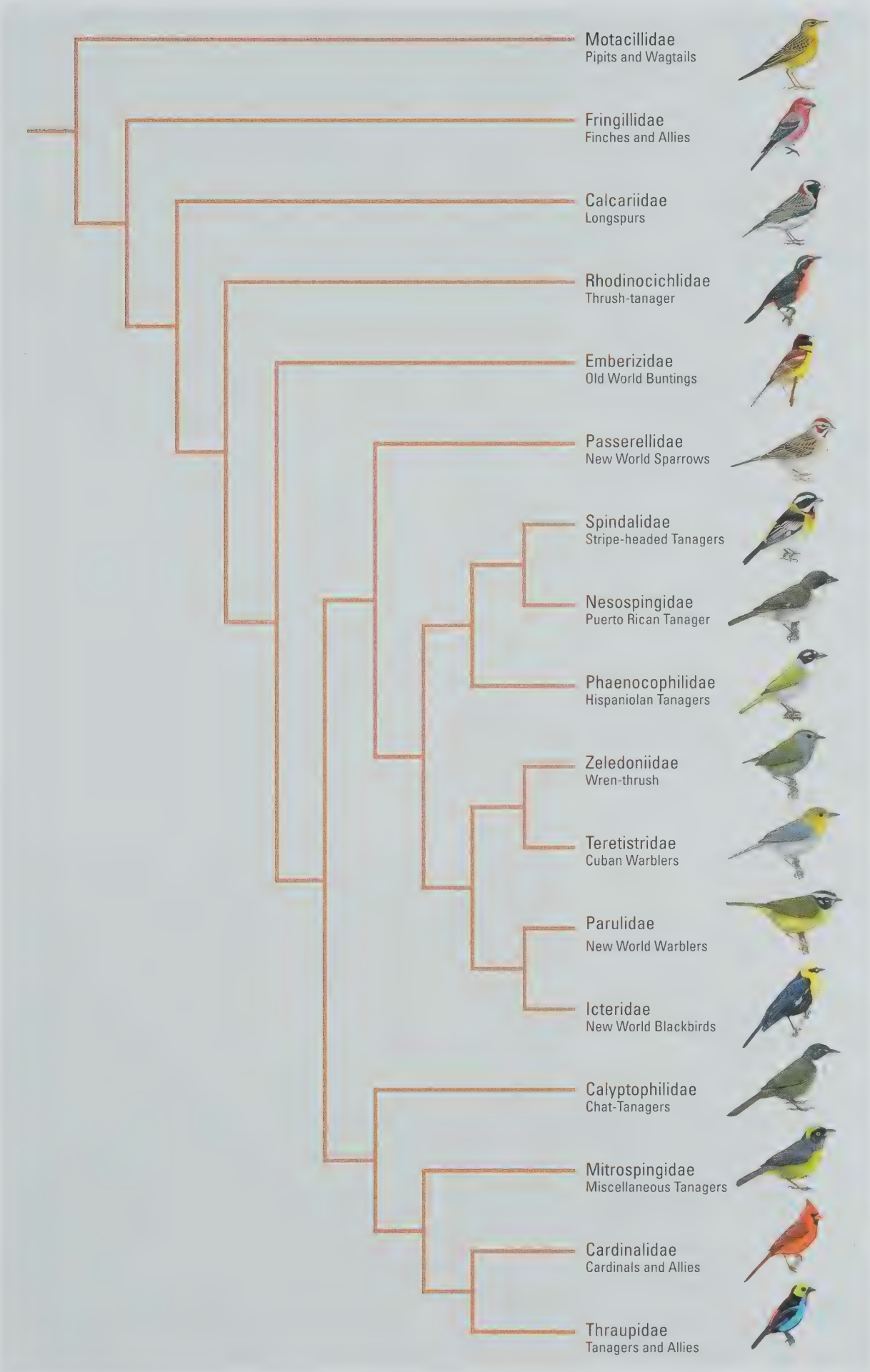



**Figure 5**. Hypothesis for phylogenetic relationships of the nine-primaried oscines and their immediate allies from Barker *et al.* (2013).

Cook 2005), with each branch successively sister to all that follow. In Figure 5, the unbalanced part of this phylogeny eventually gives way to a more balanced, bush-like and more evenly branched portion of the tree, starting in this figure with the part of the tree containing Passerellidae and all its allied families.

We point out this nuance in tree topology because we use the adjective "basal" to refer to two groups of passerines, the "Basal Oscines" and the "Basal Passerids," both of which have the property that most of the single families in them are sister to a much larger group of families in the same successive progression that we saw in Figure 5. Note that, as we progress "up" the tree in Figure 5, each of the successive families in the unbalanced portion of the tree forms a monophyletic group with all those that come next. This is a function of the fact that one of the branches at each of these nodes has only one remaining family while the other branch is comparatively richly endowed with extant families. Note that the word "basal" does not indicate that the taxon is primitive or ancestral relative to the other groups (Krell & Cranston 2004). Rather, "basal" means that they diverged earlier in the tree than did some other groups, and the branch that they represent either did not diversify greatly or all the other taxa that derived from this branch have become extinct and are not represented in the contemporary fauna. It must remain clear that neither of our "basal" groups is a natural group: neither represents a monophyletic clade and they both leave out the more bush-like and diverse parts of the trees that come later in each of their trees. The "basal" designations are just informal labels of convenience that allow us to refer to collections of families that are deeply diverged in a clade without creating a separate name for each of the clades they represent.

### *Morphology, Molecules, and Math: The Rapid Advance of Avian Systematics*

As noted already, modern avian classification is based on phylogenies, yet phylogenies are hypotheses that can change with the addition of new information or better methods of analysis. Avian systematics as a discipline has a rich and venerable history, with every successive generation of researchers making notable contributions to our understanding of avian diversity and its evolutionary origins.

Until the 1970's, most of our knowledge of avian relationships came from careful studies of morphology, behavior, and other visible traits of birds. Such studies continue today, but they are now augmented by new sources of information. At present, the majority of researchers working on avian systematics employ some type of genetic information—usually DNA sequences—as their primary data. The technology needed for gathering this type of data has advanced rapidly, and it is now relatively straightforward and inexpensive to obtain large quantities of DNA data from avian tissue samples. These technological advances have caused a steady increase in the number of people studying avian relationships and in their scientific output. For example, in the year 2000 there were roughly 150 scientific papers published on avian phylogenetics, whereas three times as many such papers were published in 2010. This means that most new information on avian relationships derives from genetic studies.

Genetic data have the further advantage that all birds have DNA with only four different bases that get combined to form each species' genetic code in the sequence of its DNA. These sequences can be compared easily, something that is not always true with morphological characteristics. The analysis of DNA sequence data has become not only dramatically more sophisticated but also more widely applied in reconstructing phylogenetic hypotheses. Enormous molecular datasets, once they are generated, can now be analyzed more quickly and more accurately than ever before. Mathematical algorithms (which these days often require a high-performance computer) are used to try to find the best match between the distributions of genetic characters and the phylogeny that connects the evolutionary lineages in which they have evolved.

One advantage of these data-rich approaches to avian systematics is that they can sometimes tell us what we don't know, as well as what we do. In many phylogenetic analyses, researchers estimate the statistical support for each branch or clade in their tree. Relationships that have substantial corroboration are said to be strongly supported, whereas relationships that are more tenuous are said to be weakly supported. Even within the same phylogenetic analysis, it is normal and expected for some clades to receive high support and others low support. In large part this stems from the difficulties of reconstructing evolutionary events that happened long ago. It is easiest to back-calculate the branches in a tree that persisted over a long period with no splitting. It is substantially more difficult to reconstruct the splitting order of branches that separated over short time intervals, especially when that splitting happened long in the past. When support is lacking for a particular branching pattern, a phylogeny may show three or more lineages that come together in a polytomy to indicate that they do cluster together, but that their precise branching order can't be determined with a high degree of confidence.

No part of phylogeny estimation is perfect. More data could always be collected or additional avian lineages added to a study. The different methods of analysis all have strengths and weaknesses, and some datasets are simply so large that even the fastest computers can't fully analyze them. Even in the same group of birds, analyses of different data sets sometimes yield different phylogenetic hypotheses. Despite these caveats, however, it is undeniable that our understanding of avian relationships is steadily improving. This is an exciting time to be interested in avian diversity!

## The Meaning of Higher Taxonomic Ranks

Most ornithologists agree that the categorical rank of "species" indicates a true biological entity: a House Sparrow *Passer domesticus* is definably and fundamentally different than a Eurasian Tree Sparrow *Passer montanus*. How to separate two species is often the subject of (sometimes bitter) debates, however, with some researchers focusing most intently on whether two bird populations interbreed now and in the future, and others focusing on whether they have evolved diagnostic differences. In general, though, most would agree that species have an intrinsic biological reality.

This underlying biological reality is not true—at least not in the same way—for any of the categorical ranks above that of species—the categories of genus, family, order, and so on. Instead of being fundamental biological units, these higher categories are human constructs, levels that we have defined for our own convenience as a logical way to organize and classify biological diversity. But the hierarchical nature of phylogenetic trees allows us to define these higher groupings in non-arbitrary ways. When the criterion of monophyly is applied to the groups we recognize, we assure that members of those groups share a set of characters, derived from their common ancestor, that distinguish them from others of equal categorical rank. The nesting of each category into those successively higher up in the rank of categories parallels the increasing size of clades as we follow a tree from its tips deeper toward its root. The structure of our classification can parallel the way that members of each of these groups evolved from their common ancestors. When each formally named group corresponds to a clade, the hierarchical classification system is both the most natural and meaningful way of organizing the diversity of birds.

## The Challenges of Using Phylogenies to Classify Birds

Despite the underlying logic that links the phylogeny of birds to their higher classification, there are several ongoing challenges in deciding how to divide avian diversity among orders, families, and other ranks in the taxonomic

hierarchy. One challenge is deciding exactly where to draw the boundaries that define these groups. It is possible to give a name to every separate clade in a phylogenetic tree (and there are some systematists who advocate this entirely logical type of classification). In practice, however, this comprehensive approach creates a vast number of named entities when it is applied to such a highly diverse group as birds.

In current practice, the starting point for defining avian families and orders is still the long-standing tradition of classification as it has been applied to the group, modified as necessary by new phylogenetic information to help ensure that every named group is monophyletic. We follow this "updated traditional" approach in this book. Like other systems, this approach to classification has both strengths and weaknesses. One of its drawbacks is that there is no absolute criterion for where the boundaries of families and orders are drawn. Some families, like Opisthocomidae (the Hoatzin) or Acanthisittidae (New Zealand wrens) or Regulidae (kinglets) diverged from their extant sister taxa a very long time ago, and others, like Teretistridae (Cuban warblers) or Nesospingidae (Puerto Rican Tanager), likely diverged from their common ancestor a much shorter time ago. All families are not defined equally (Figure 6).

On the other hand, a strength of this mixed approach to the classification of families and orders is that it is more consistently dependable than many alternatives; researchers have been refining our classification of avian diversity for more than two centuries, so most of the clades we presently rank as orders and families have been recognized as such for many years. This relative stability is a practical asset to everyone who studies birds; these higher ranks are, after all, a human construct that we have developed to help us make sense of a diversity that would otherwise be utterly bewildering. Furthermore, although the criterion of monophyly has been widely adopted since the 1970's, earlier systematists usually looked for consistent and substantial differences when separating birds into differently named groups. Traditional classifications therefore usually designate families and orders with noticeable differences in body form, plumage, or behavior. These visible characters are what primarily matter to most people who enjoy avian diversity—and more often than not they turn out to correspond to well-supported clades.

Nonetheless, incorporating new phylogenetic information into traditional avian classification often creates situations where alternative classifications are all reasonable, or (more frustratingly) where the new information suggests that the traditional classification is incorrect in some way but does not provide a strongly supported phylogeny with which to refine it. These ambiguous situations require judgment calls about whether that new information is sufficiently robust to overturn the traditional classification, as well as where exactly to draw new boundaries.

Some of these challenges can be illustrated by a current phylogenetic hypothesis for the clade comprising the barbets and toucans. Traditional classifications generally recognized two families for these birds, placing all the barbets in Capitonidae and the toucans in Ramphastidae. Recent phylogenetic evidence, however, supports a more detailed phylogenetic arrangement (Figure 7), which places the toucan clade embedded within the broader barbet group. There are two clear ways to proceed while maintaining the principle of monophyly: either lump together all the barbets and toucans in a single family, or continue recognizing the toucans as their own family, which requires the division of the barbets into four additional families. This latter approach is the one we have taken here, because each of the five groups has distinguishing properties and distributions, and by recognizing them we are able to retain a valuable detailing of avian diversity.

The barbets and toucans represent just one example of many such judgment calls that underlie any higher-level classification of birds. This book presents one of the many possible classifications based on a merger of traditional taxonomy with current phylogenetic studies. When confronted by a choice between recognizing one larger, more inclusive family versus multiple smaller families, we try to adopt the version that will result in families that are most recognizable and internally coherent. Such families are easier to generalize, easier to learn and remember, and more useful for organizing the diversity of avian characteristics. With this as an underlying motivation, the Relationships sections of each order and family account summarize the specific rationale for recognizing each group and provide citations to the most relevant recent phylogenetic findings.

As a guide to the organiztion of the families in a linear order for this book, we have combined the results of the two larg-



**Figure 6**. Not all families are the same in size or age. The Rifleman on the left is one of only two species on Earth in the Acanthisittidae, but this family diverged from other extant passerines over 50 million years ago. The Oriente Warbler on the right is one of only two species in the Teretistridae, but it has likely diverged from its nine-primaried oscine relatives less than five million years ago. (Rifleman *Acanthisitta chloris*, Kaikoura, New Zealand; Oriente Warbler, *Teretistris fornsi*, Siboney, Cuba; both photos © D.W. Winkler)

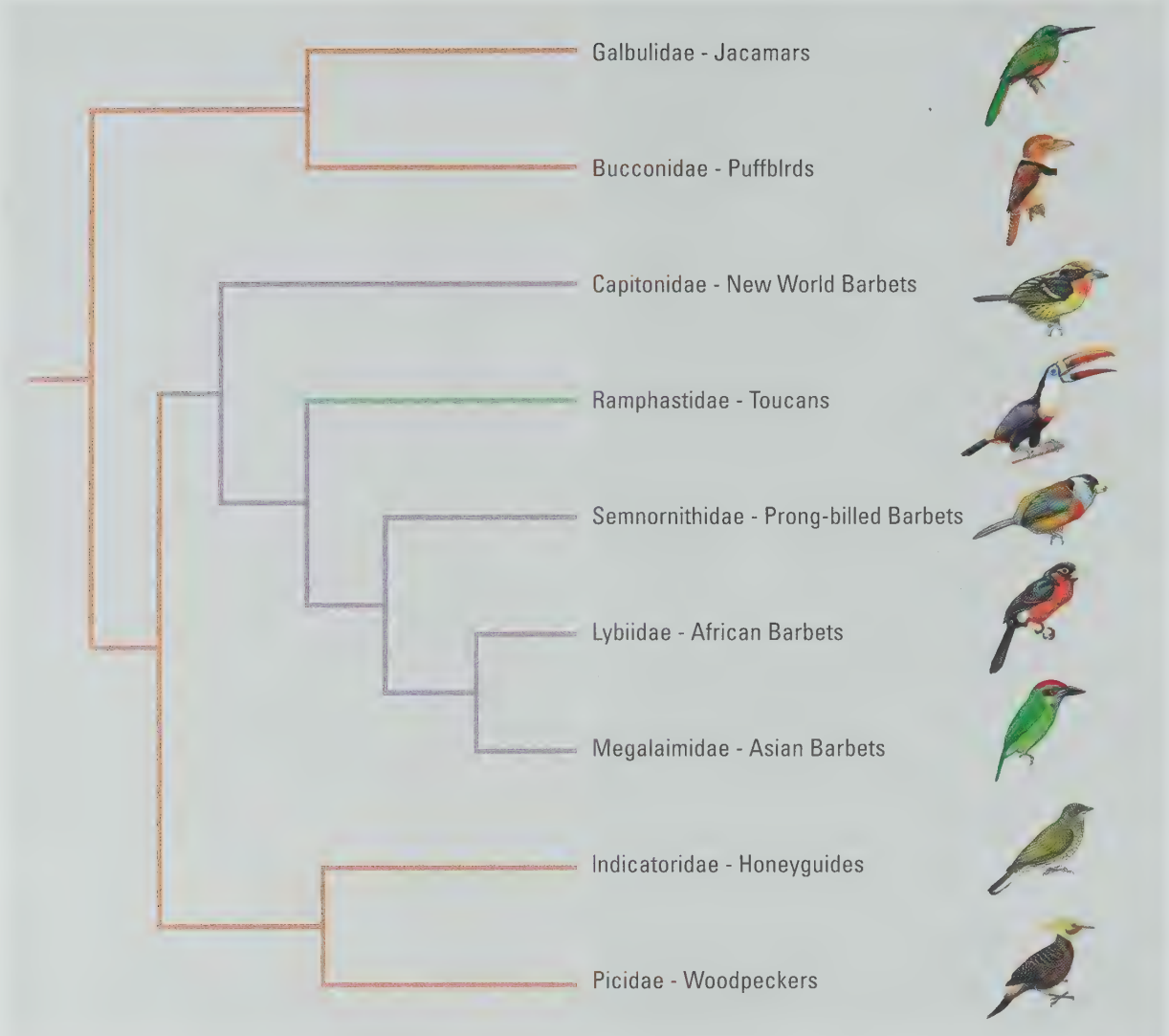



**Figure 7**. Hypothesis of phylogenetic relationships in Piciformes. Purple branches indicate the lineages often placed together in a broader barbet family Capitonidae. The discovery that the toucans (green branch) fall well within this group requires either lumping the toucans in with this large barbet family or, as shown in this tree and followed in this book, recognizing separate families for the four groups of barbets plus the toucans.

est-scale molecular studies of avian relationships in a provisional hypothesis for the relations of the orders of modern birds (Figure 8).

## Extinction and Diversification

Despite many amazing paleontological discoveries in recent decades, the 150-million-year-old *Archaeopteryx* is still the oldest known fossil that most would agree should be called a bird. After *Archaeopteryx*, there was a great diversification of birds in the Cretaceous Era (145 to 66 million years ago), known to us now from an ever-increasing array of fossil finds. But that Cretaceous fossil fauna represents groups that bear no close relation to those that replaced them in the Paleogene Period (formerly known as the Tertiary). One of the interesting debates in avian evolutionary studies today is over the extent to which modern avian groups actually began diversifying in the Cretaceous, before the massive K-Pg (formerly K-T or Cretaceous-Tertiary) extinctions that spelled the end of all the major dinosaur lineages and so much more. Many paleontologists read the fossil record fairly literally and conclude that the absence of most modern groups among Cretaceous fossils means they did not exist then, whereas comparative biogeographers and molecular biologists often look at current distributions of birds and the large amounts of molecular divergence among many modern clades and conclude that modern birds must have differentiated before the K-Pg boundary. No matter how future evidence accumulates to resolve this debate, it is clear that a very diverse set of lineages of Cretaceous birds have gone extinct. And even among modern birds, we know from fossils that a tremendous diversity of forms once existed that are now extinct. Indeed, most biologists agree that the 10,500 or so species of birds that we have on Earth today constitute a very small proportion of all the bird species that have occurred on Earth since the earliest birds became distinct from their dinosaurian ancestors.

The numbers of bird species in a fauna can be thought of as a balance between the rate at which they are being added through speciation and immigration on the one hand, and the rate at which they are being taken away by extinction on the other. Speciation generally occurs when a population occupies a new area with new ecological pressures, responds to natural selection with a change in the properties of its members and their genetic composition, and over time becomes reproductively isolated from related populations elsewhere. It is most rapid at times when ecological opportunities abound—as when a new area is colonized or when ecological conditions change rapidly. Some of the most dramatic explosions of avian variety occur in lineages that diversified greatly after colonizing a new region. Examples of this process of adaptive radiation include the vangas (Vangidae) of Madagascar, the honeycreepers (Fringillidae) of the Hawaiian Archipelago, and the entire New World suboscine songbird group. In each of these cases, the group colonized new territory with (presumably) few competitors and then

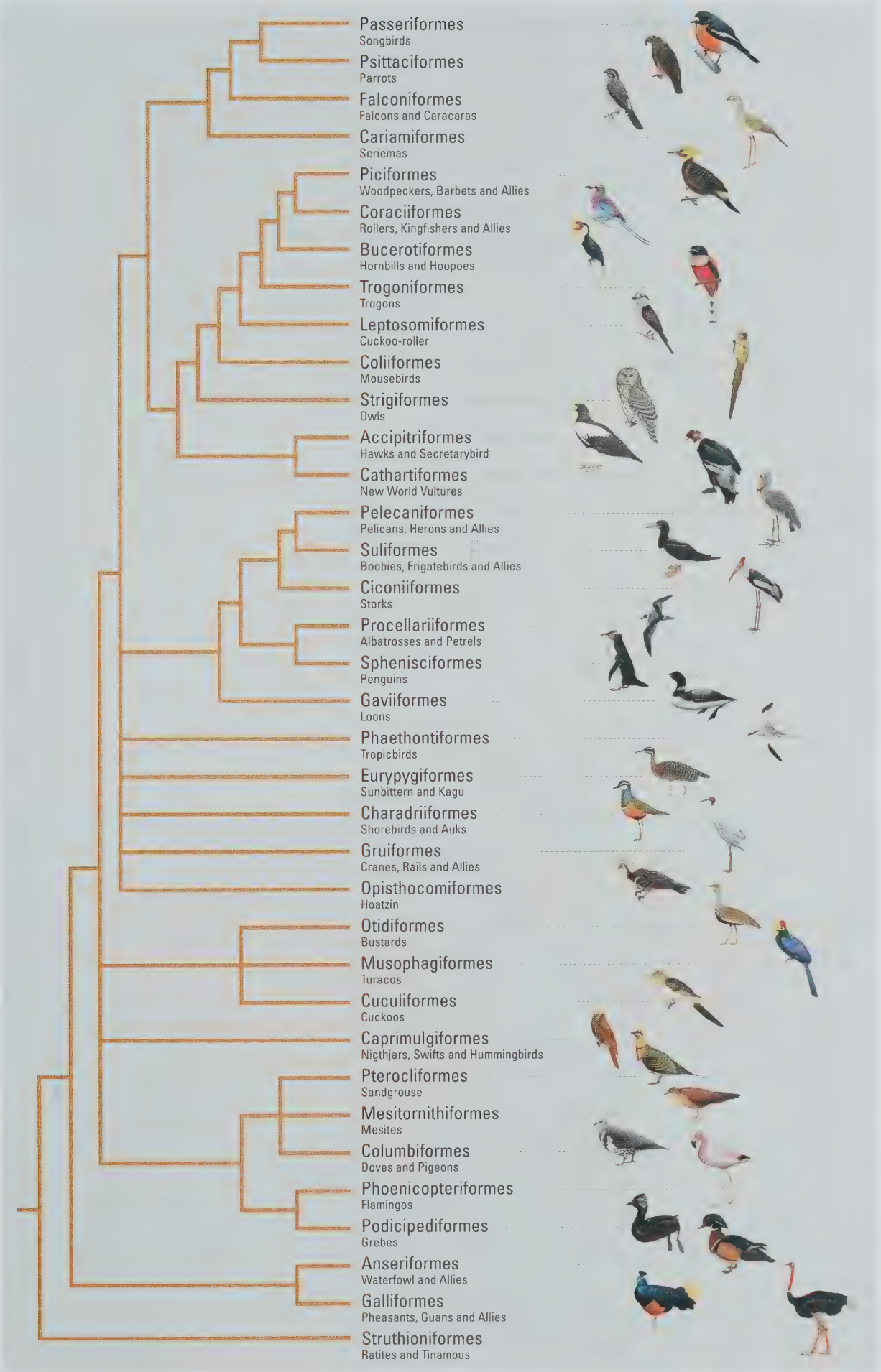



**Figure 8.** A phylogenetic hypothesis for all the orders of birds of the world. Based in large part on the work of Hackett *et al.* (2008) and Jarvis *et al.* (2014), this is the phylogenetic hypothesis that has guided our designation and ordering of the clades in this book.

diversified into a dazzling variety of forms to fill empty ecological niches. A similar burst of diversification around the time of the K-Pg extinctions may have generated most of our existing avian orders and many existing families.

We now know that this uneven pace of diversification, characterized by long periods of stasis with occasional jumps in the speciation and diversification rate, occurred in many if not most lineages of organisms everywhere. But these ecological opportunities with few competitors are pretty rare and far between, so the tree of life has a rather patchily filled-out form: some branches are very densely filled out by species taking advantage of empty niches, whereas others reflecting a history in competitively full environments are more leanly populated.

Extinction has been at least as big a factor as speciation in why some groups of living birds are so much more diverse than others. It can generate the big evolutionary gaps that often separate one group of birds from another. As we survey the diversity of modern birds, we see that many families are very distinctive and easily recognized; there are no other birds like them today. Such notably distinctive families include the hummingbirds (Trochilidae), flamingos (Phoenicopteridae), and penguins (Spheniscidae). In contrast, birds in some other families can be maddeningly difficult to recognize, as they are very diverse with seemingly intermediate forms blurring the distinctions between families. Thus, it can be very difficult to recognize a given species as a chat (Muscicapidae) versus a thrush (Turdidae), or as a tanager (Thraupidae) rather than a cardinal (Cardinalidae).

The degree of distinctness among and between these groups is no doubt at least in part due to fundamental differences in form and function that arose in the diversifications at the root of the lineages: many (most?) lineages may have gone through an explosive early diversification phase as they explored new ecological opportunities. But in many more cases, the degree of distinctness between groups is ascribable to the degree to which extinction has occurred in the history of each lineage. Thus, the reason cardinals are so difficult to distinguish from tanagers appears to be largely that those radiations are more recent—extinction has not yet removed many of the intermediate forms in the family's evolutionary exploration of all the possibilities for morphology and behavior in birds of this general type. We don't think that hummingbirds sprang *de novo* in their modern form from a caprimulgiform-like ancestor. There almost certainly were many intermediate forms—now long extinct—that bridged the morphological gap between the ancestors of hummingbirds, the ancestors of swifts, and the ancestors of the various nightbirds that constitute the remaining families in the Caprimulgiformes. Likewise, it seems likely that in earlier times there were many more relatives of the New Zealand Wrens (Acanthisittidae) than the very few, morphologically similar, species that are extant today.

We can think of all birds, past and present, connected in a rich tree of life, the trunks, branches, and twigs of which are the ancestor-descendant relationships that ultimately connect them all to each other. If we think of placing this tree on one long tapestry telling the story of the diversification of birds over the 150 million years that birds have been on Earth, what is left among modern birds is only one very ragged edge of that tapestry. Extinction, the unforgiving editor of historical diversity, is probably the most important cause of breakpoints between the living groups of birds we call families; as in human creative enterprises, definition comes from what is left behind after editing.

## Faunal Regions and Avian Endemism

Avian diversity has some fascinating properties when viewed across the surface of Earth. At all levels in the systematic hierarchy, birds are generally more diverse in the warmer, more tropical regions of the world. In the distributions of organisms, we can think of Earth as being subdivided into distinct biogeographic or faunal regions (Figure 9). The bird communities of these regions are recognizably distinct—they have different proportions of frugivores and migrants, different characters of songs in their dawn choruses, different predominant nest types, and so on. All these distinctive properties stem from the particular sets of families that occur in each area. Most families of terrestrial birds are limited to one or a few faunal regions, and the number of

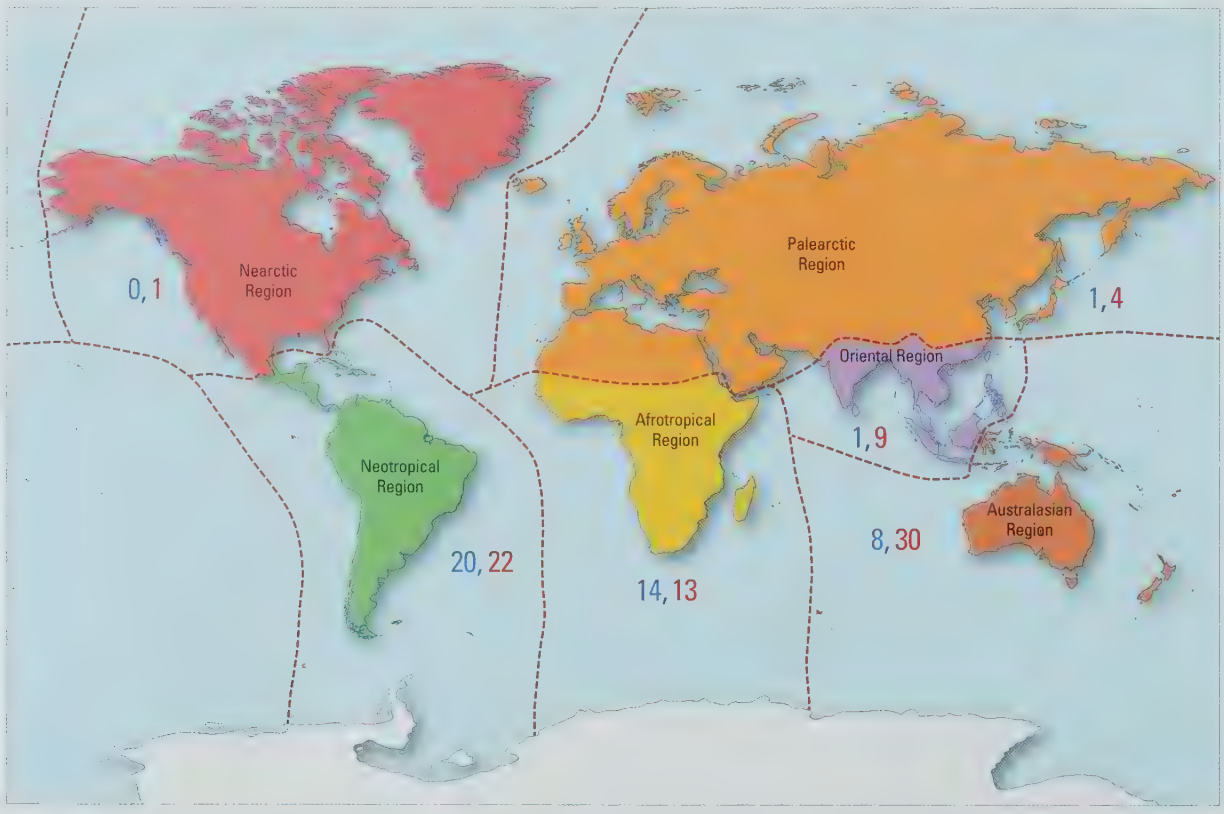



**Figure 9.** The biogeographic regions of Earth along with the numbers of endemic non-passerine (in blue) and passerine (in red) families in each.

**Table 2.** A summary of the endemic families occurring in each of the Biogeographic Regions delimited in Figure 9.

| | Non-passerines | Passerines |
|---|---|---|
| **Neotropical Region** | Rheidae<br>Tinamidae<br>Cracidae<br>Anhimidae<br>Eurypygidae<br>Steatornithidae<br>Nyctibiidae<br>Opisthocomidae<br>Psophiidae<br>Aramidae<br>Thinocoridae<br>Pluvianellidae<br>Galbulidae<br>Bucconidae<br>Semnornithidae<br>Capitonidae<br>Ramphastidae<br>Todidae<br>Momotidae<br>Cariamidae | Sapayoidae<br>Thamnophilidae<br>Melanopareiidae<br>Conopophagidae<br>Rhinocryptidae<br>Grallariidae<br>Formicariidae<br>Furnariidae<br>Pipridae<br>Cotingidae<br>Tityridae<br>Donacobiidae<br>Dulidae<br>Rhodinocichlidae<br>Zeledoniidae<br>Teretistridae<br>Phaenicophilidae<br>Spindalidae<br>Nesospingidae<br>Calyptophilidae<br>Mitrospingidae<br>Thraupidae |
| **Australasian Region** | Casuariidae<br>Apterygidae<br>Anseranatidae<br>Aegothelidae<br>Rhynochetidae<br>Pedionomidae<br>Strigopidae<br>Cacatuidae | Acanthisittidae<br>Menuridae<br>Atrichornithidae<br>Ptilonorhynchidae<br>Climacteridae<br>Orthonychidae<br>Pomatostomidae<br>Dasyornithidae<br>Pardalotidae<br>Mohouidae<br>Eulacestomidae<br>Maluridae<br>Cnemophilidae<br>Neosittidae<br>Psophodidae<br>Paramythiidae<br>Oreoicidae<br>Cinclosomatidae<br>Falcunculidae<br>Rhagologidae<br>Ifritidae<br>Machaerirhynchidae<br>Melampittidae<br>Corcoracidae<br>Paradisaeidae<br>Callaeidae<br>Notiomystidae<br>Melanocharitidae<br>Petroicidae<br>Hylocitreidae |
| **Afrotropical Region** | Struthionidae<br>Numididae<br>Mesitornithidae<br>Musophagidae<br>Sarothruridae<br>Balaenicipitidae<br>Scopidae<br>Pluvianidae<br>Sagittariidae<br>Coliidae<br>Leptosomidae<br>Brachypteraciidae<br>Phoeniculidae<br>Lybiidae | Philepittidae<br>Malaconotidae<br>Platysteiridae<br>Picathartidae<br>Chaetopidae<br>Nicatoridae<br>Macrosphenidae<br>Bernieridae<br>Hyliotidae<br>Buphagidae<br>Modulatricidae<br>Promeropidae<br>Viduidae |
| **Oriental Region** | Megalaimidae | Aegithinidae<br>Pityriasidae<br>Platylophidae<br>Eupetidae<br>Timaliidae<br>Pnoepygidae<br>Irenidae<br>Chloropseidae<br>Elachuridae |
| **Palearctic Region** | Ibidorhynchidae | Panuridae<br>Hypocoliidae<br>Prunellidae<br>Urocynchramidae |
| **Nearctic Region** | | Peucedramidae |

endemic families in the different regions is extremely variable (Table 2, Figure 9). Thus, within five minutes of being placed in a natural habitat anywhere on Earth, an ornithologist who knows her bird families can likely determine which faunal region she has landed in.

Of the 243 families of birds, a little over half (123) are limited in their distribution to just one of the biogeographic regions. This is one of the great paradoxes of avian biogeography: that birds, which have the greatest potential mobility of any vertebrates, are so limited in their distribution, having rates of regional endemism comparable to those of mammals, amphibians, and reptiles. We do not have a complete explanation for this disparity between the high movement abilities of birds and their high endemism, but it is useful to reflect for a moment on what causes us to recognize a group of birds as being endemic to a particular area. Endemism is a function of both the classification of avian groups and the extent of the region being evaluated. The more inclusive a taxonomic rank, the harder it is to be counted as an endemic in any given area. There are many small areas that support an endemic species of bird, but relatively fewer that support endemic genera or families, as those more-inclusive ranks generally include more species, each with their own ranges that are more likely to transcend the boundaries of a small geographic area. Thus, all else being equal, larger geographic areas support more endemics than do smaller areas. But even at the level of families and in the faunal regions agreed upon for many decades by biogeographers, decisions about endemism can depend upon hypotheses of relationships.

Not many years ago, ornithologists recognized one endemic family in North America, the Chamaeidae. It is now clear on the basis of molecular analyses that the sole member of that family—the Wrentit *Chamaea fasciata*—rightly belongs in the diverse Old World family Sylviidae. Meanwhile, molecular studies have confirmed earlier suspicions that the Olive Warbler *Peucedramus taeniatus* is not a warbler at all, but rather is so distinctive that it deserves to be in its own family—thereby making the Peucedramidae the only family that is endemic to the Nearctic faunal region. (Its range extends into the mountains of Central America, but it stays in pine-oak woodlands there that lack the distinctive warm, moist character of core tropical forests, justifying its designation as the sole endemic in the Nearctic Region.) In any event, designations of endemism depend on systematics, and systematic investigations help us recognize what groups are endemic. This changing understanding of patterns of endemism has various practical outcomes, from heightening conservation concerns—an endemic group with no close living relatives is arguably more important to conserve than a member of a widespread group that is less evolutionarily distinctive—to motivating the travel decisions of birders trying to see the largest possible slice of the world's avian diversity.

We have provided a list of the families that we consider endemic to each of the Biogeographic Regions (Table 2) along with a visual summary, region by region, of the different birds in each (Figure 10) to back up the tallies of endemics in Figure 9. We hope these will serve as both a valuable means of keeping track and a source of further inspiration for those motivated to see, photograph, or study birds in all the families of birds of the world. The list also highlights how difficult it can be to decide whether to designate a taxon as endemic. Should Aramidae be disqualified as a Neotropical endemic just because Limpkins occur in the subtropical climes of Florida, a blip on the otherwise entirely Neotropical distribution? Similarly, should Tityridae not be considered a Neotropical endemic just because one of its 38 species happens to breed a little far north of the traditional boundary of the tropics in Mexico? And the single species in the Ibidorhynchidae breeds in the mountains of Asia, right on the southern edge of the Palearctic region. Whether we consider it an endemic to that region depends on the details of where the regional boundary is drawn, but we have counted it as a Palearctic endemic because its breeding range is in the cold temperate habitats of the region's mountains.

**Figure 10**. Paintings of representative species of each of the endemic families in each of the biogeographic regions from Table 2. The distinctive character of the bird faunas in each of these regions derives from its endemic families, which live there and nowhere else. Size of paintings only approximately to scale, and scale different in each region.




Afrotropical
Region
14 Non-passerines
13 Passerines


Australasian
Region
8 Non-passerines
30 Passerines




One potential complication may occur to temperate-zone bird enthusiasts. Do we base our judgments of endemism for migratory species on breeding distributions alone or on the entire year-round range? It turns out that the migrant-rich faunas of the Northern Hemisphere, with so many species that migrate out of the Nearctic and Palearctic to spend the winter in different (and tropical) biogeographic regions, also have closely related species that spend the entire year in those tropical regions. Thus, the only endemic passerine families in the north temperate zone (Panuridae, Prunellidae, Hypocoliidae, Peucedramidae, and Urocynchramidae) are also the only ones that lack migrants to the tropics.

A quick glance at Figure 9 reveals a remarkable concentration of endemism in the Southern Hemisphere. On first sight, this might seem to provide evidence that the Southern Hemisphere may have been the cradle of Cretaceous diversification, as alluded to above. But it seems very unlikely that the vast and dynamic areas of the Northern Hemisphere did not provide plenty of opportunities for diversification over the past 100 million years or so. More likely is that this paucity of endemic forms in the North is due to differences in rates of extinction rather than diversification, for the Northern Hemisphere has almost certainly experienced much higher rates of avian extinction over the past 2.5 million years than has the Southern. The source of that extinction is familiar and still with us: ice. The glaciations that have scrubbed large expanses of the North repeatedly throughout the Pleistocene may yet return, but even if they do not, they have left a lasting mark on the faunas (and floras) of the North. The largest contrast in patterns of endemism, the North-South disparity, arises from the fact that the avifaunas of the North are composed almost entirely of taxa that have developed ways of coping with the extreme seasonality of habitats there. Not only are these habitats seasonally harsh, they have also been ephemeral over recent geological time, and the faunas there are made up of forms that have had the ability to repeatedly colonize those habitats as they have

emerged again and again from the life-crushing ice. These are forms that have necessarily retreated to and colonized from the tropics or subtropics, and this ongoing connection with regions to the south has robbed the region of endemism. We feel sure that if we could have visited Earth in the late Paleogene, before the Pleistocene glaciations began, we would have found endemic forms in the north that have left no descendants on Earth today. But perhaps more importantly, we likely would have found far fewer endemics in the south, because we suspect that a lot of families that are now limited to the tropical regions would have had representatives in the northern regions, denying them endemism in the south. (We are ignoring here, of course, that biogeographers working in the Paleocene likely would have drawn the borders of biogeographic regions very differently.)

One can spend a great deal of time thinking about biotas of the past, but the important thing as we study and learn the faunas of the present is to constantly bear in mind that patterns of biodiversity and endemism, and the process of diversification itself, arise from a dynamic balance between the creative forces of speciation and the editing forces of extinction. Whether tiny regions that today support disproportionately large numbers of endemic forms (e.g., Madagascar, Hispaniola) are likely to do so in the future is anyone's guess. Bird-listers in the modern world know that visits to these and other restricted sites like New Caledonia, Sulawesi, Borneo, and the highlands of China, together with the main continental centers of endemism, are going to be necessary if they want to tick or twitch all the families on the world list. But biologists contemplating these hot spots of endemism are left wondering, for each one, whether it is the emerging first bubble of an effervescence of diversity or the relic of diversifications that have now run their course. We will not live to see the answer, but we can continue to develop methods to help us understand.

## Using This Book

### Overall Structure

The majority of this book consists of accounts of each family of extant modern birds. Many orders contain only a single family, but for orders that contain more, there is a separate order account on a page preceding the family accounts. The order account includes information on the families contained in the order as well as a brief review of the relationships among the families in the order and the placement of the order within the larger avian phylogenetic tree. Two orders (Charadriiformes and Passeriformes) are sufficiently large and diverse that we have divided them into groups of families within. We treat these groupings the same as an order, with a separate "subgroup" page for each.

Immediately after this introductory section is a formal description of three new family names used in this book (pp. 33-34). The bulk of this volume then proceeds with accounts of each of the 243 families of birds on Earth today, including one further phylogenetic tree (Figure 11, page 268) that presents a working hypothesis for the relationships among the groups in the most diverse order, Passeriformes. After the last of these family accounts, we provide a listing of the references for all literature cited in the book, then a glossary of all technical terms used, and an index to the entire volume.

### The Family Accounts

**The red bar and group names.** At the head of every family account is the order (and subgroup if appropriate) to which the family belongs, followed immediately by a red bar containing, on the far right, the number of genera and species in the family. These numbers reflect the numbers in the *HBW and BirdLife International Illustrated Checklist of the Birds of the World*. To the left in the red bar are the family name and the common name we have chosen to represent the group. We have made every effort to make these names as short as possible, and, in the process, we have left out many other common names for species in that family. So, for example, Phasianidae has the common name "Pheasants and Allies" even though it includes birds that are known as partridge, quail, turkey, grouse, ptarmigan, etc. We have done this because we illustrate a member of each genus in the family with a painting from the *Handbook of the Birds of the World*, and with that painting is the Latin name and common English name of the species chosen to represent that genus. With very few exceptions, a quick glance across the paintings at the end of each account will acquaint the reader with all the common names used in that family. And the index for this book contains all these common names, so the reader who knows only the English common name for a bird should be able to get to the appropriate family by consulting the index. Another convention used in the text for each family account is to sometimes use Latin generic names rather than common names, especially if the painting for that genus contains the common name as well. Also, monotypic genera (those that contain only one species) will often be designated by their generic name alone.

As recreational birders and ornithologists have grown more cosmopolitan in their activities, there has been increased attention to standardizing and regularizing the common English names of all the birds of the world. In choosing common names for the families, we have usually adopted one of the common names used for species in that family. In the few cases where the family is monotypic and thus the single species is a distinctive identifier of the family, we have often elected to drop the modifier in the common name for the family (hence, Black-capped Donacobius is here called simply Donacobius, Crested Shrike-jay simply Shrike-jay, etc.).

In treating compound common names of families and groups, we strove for simplicity and clarity, and gave a nod to convention, even though that sacrificed some consistency. Generally, we tried to avoid overuse of hyphens. We use them mostly when a family name consists of two bird names, where reading the name would be cumbersome without a hyphen, or, rarely, when it is a long-standing usage. Here are specific cases that arise:

1. When both words are common bird names:
   A. If the second name is not of a bird in the family to which the compound name refers, we hyphenate the compound name. Thus, we prefer Shrike-jay and Cuckoo-shrike, and we place the second part in lower case to indicate that the bird is not in the family to which the compound name refers.
   B. If the second bird name in the compound name *is* the name of the family or group of families to which the compound name refers, we capitalize both names (e.g., Chat-Tanager).

2. When the second word *is* a common bird name but the first word is not:
   A. If the second name is of a bird not in the family to which the compound refers, we aim to combine them into a single word (e.g., Fairywren, Woodrail). If, however, the resulting compound word would be too cumbersome, we use a hyphen to separate the two parts of the compound (e.g., Bush-shrike, Penduline-tit, Laughing-thrush).
   B. If the second name *is* of a bird in the family or group of families to which the compound refers, we keep them as separate words and capitalize them both (e.g., Barn Owl)
   C. When the second word is not a recognized common name of any particular bird family, but rather a more general name (e.g., Warbler, Flycatcher), we treat the modifier and the group name as two separate words (Leaf Warblers, Silky Flycatchers).

**The right column.** Beneath the red bar, the content of each family account is presented in a three-column format. The right-most column contains the following items, from top to bottom:

Size icons: These icons are meant to capture the variation in size in members of the family, with a silhouette for the largest and smallest members of the family presented along with a silhouette of an average-sized human (or part thereof) for scale.

Range map: The map summarizes the native distribution of all the species in the family, combined. We do not include ranges that were once occupied by now-extinct species or currently occupied by introduced populations. Green is used for parts of the distribution where at least one species in the family occurs year-round, yellow is used for the parts of the distribution in which species of the family occur only during the local breeding season, and blue is used for parts of the distribution where species in the family are found only in the non-breeding season.

Gray box vignette: Beneath the map is a gray box that contains a short text vignette that is meant to refresh your memory and/or entice you to read more about this family of birds. We hope this vignette can serve as your point of entry on first reading or review after some time away from the birds of the world.

**The left two columns.** The core of the family accounts appears in the other two columns beneath the red bar. The information is presented in a standardized order under the following headings:

Related families: This section lists the other families to which the focal family is most closely related, i.e., with which it appears to have a sister relationship. Note that, if the family is sister to a large group of families, this list may be long, and if there is a clear sister family, the list may be only one family long. In many cases, sister relationships are not quite clear, and this list may include a few equally well-supported candidate sister groups. For further detail see "Phylogenies and Avian Classification" above.

Similar birds: This section lists the birds (and their families) that are likely to most resemble species in the focal family. Note that this resemblance could be structural or behavioral or both, and we have drawn these from the entire world fauna, not just local species with which the birds might be confused.

Description: This section summarizes, in a series of bulleted phrases, the germane properties of species in the focal family, in the following order:

- General coloration and structure of the plumage
- Relative length and shape of wings and tail: Length is judged relative to the length of the body; a long tail is one longer than the core body (excluding legs, tail, wings, neck and head) and a short tail is substantially shorter than the body. Long wings are those that, when folded on the body, extend well beyond the end of the body, and short wings are those that do not extend as far as the tail base.
- Body size and shape: The icons give an absolute indication of size, but for a relative indication of body size we use different scales for passerines and non-passerines, which are, on average, much larger. A large non-passerine is goose-sized or larger, a small one is the size of a pigeon or smaller, and, of course, hummingbirds are tiny. For passerines, large is the size of a crow or larger, and small is anything the size of a sparrow, bunting, or small bulbul and smaller, leaving jays, thrushes, most bulbuls, etc. as medium-sized. Shape is harder to describe, and when we categorize shapes, we are referring to the shape of the bird's body minus the head, neck, and tail, the "core body." Most bird bodies are approximately the shape of a hen's egg; they are ovoid, generally elliptical, with slightly more mass anteriorly in the region of the large breast muscles. Some birds have bodies that are less front-heavy in mass, more cylindrical in cross-section ("cylindrical ovoid") and a few are symmetrically tapered at both ends, i.e., "fusiform."
- Bill size and shape: A bill of medium length is about as long as the distance from the base of the bill to the eye, and bills of medium depth are about a third as deep as they are long. Inflated bills are those that have a larger surface area than a cone of the same length: they proceed from base to tip well outside a straight line connecting these points.
- Size of head (and eyes, sometimes) and length and thickness of neck: This is probably the most subjective part of the descriptions. Bird's heads are "normally" between about a fifth and tenth of the area of the core body, and heads that are obviously larger or smaller than that are denoted accordingly. About the same proportional rule applies to the area of the eyes relative to the head. For non-passerines, the length and thickness of the neck are pretty apparent, as the neck is often longer and held in a more extended position. Passerines have shorter necks in general and keep them tucked into a tighter S configuration most of the time, covered by feathers. Thus, passerine necks are described relative to other passerines, and a medium-necked songbird would look like a short- and thick-necked non-passerine.
- Length and thickness of legs and feet, with any special properties of toes: Again, this is in reference to a "typical" bird in which the legs are roughly the same length as the core body is deep. Similarly, "normal" toes when extended across the foot are about half as long as the legs.
- Sexual dimorphism in size or appearance.

Habitat: This is a brief summary of the habitats used by the members of each family, generally leaving out geographic details that are implicit in the map, and detailing any differences in habitats used through the annual cycle of movements.

Food: We briefly describe the foods taken by members of each family along with any distinctive details of foraging behavior and foods fed especially to young.

Breeding: We review what is known about the breeding life histories of the birds in each family. Beginning with mating systems and sociality, we move through summaries of what is known about nests, clutch size, patterns of parental care, and the rates of development of eggs and chicks.

Conservation: We briefly summarize the threats to species in each family, giving examples of the threats facing the most threatened. We summarize the numbers and proportion of species with a conservation status greater than the International Union for the Conservation of Nature's LC (Least Concern) designation. We summarize the number of species in each of the IUCN's conservation risk categories: Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW), and Critically Endangered—Possibly Extinct (CR-PE). For further information on these codes and their definitions and current information on the conservation status of any given group, visit http://www.iucnredlist.org.

Relationships: We summarize our current understanding of phylogenetic relationships within the family, and to related families. The text in this section focuses entirely on recent classification and phylogenetic studies, and does not try to synthesize the older systematic treatment of each family. We use either common or Latin names for the focal family and related families since the relevant common and Latin names are presented in the Related Families list. Also, unlike the other sections, citations to the most relevant recent scientific papers are included here, because very little if any of this information can be considered common knowledge, and it is being updated constantly. Full literature citations for these sources are provided in the Literature Cited section of this volume. Systematics is a historical science of competing hypotheses that are very difficult to test definitively, and it is important for anyone interested in bird relationships to acquaint themselves with the hypotheses that have been put forth and the evidence upon which they rest. For this volume, we have reviewed the systematic literature up through December 2014.

**Photographs.** In the photographs for this book, we have sought to assemble images that capture the essence of birds in each family, generally avoiding "field guide" poses in preference to those that show the birds behaving naturally in their environments. This project would not have been possible if it were not for the willing contributions we received from many dozens of photographers, and we list each of them in title pages of the volume, above. Many of the birds we needed to document occur in out-of-the-way places, places often visited only by professional ornithologists or bird-tour leaders, and the photos in this book have been contributed by a diverse array of such photographers as well as many committed birders. The internet is brimming with ever-better images of birds, and any reader wishing to see more images is encouraged to explore the internet for a better feel for each of the families. In the interests of space, the captions for each photo are kept as short as possible: we abbreviate "National Park" to "NP" and we leave out the words "state," "province," "department," or "region" whenever we think the meaning will be retained, and we translate place names into English as much as possible.

**Paintings of representatives of each genus.** Each of the genera in each family is represented by a painting of a single species taken from the *Handbook of the Birds of the World*. We have tried to capture the breadth of body shapes and appearances in each of the families with these paintings. As much as possible, the paintings of the genera are presented in an order that is consonant with current ideas of relationships within each family. The common name associated with each painting also gives the reader a good idea of the breadth of common names used for birds in each family, and the number of species for each genus is a good way to better understand how species diversity is apportioned within each family.

## Sources of Further Information

This book is meant as a comprehensive and up-to-date yet accessible guide to all groups of living birds. It appears at the same time that four major checklists of all the species

of birds in the world are being prepared or recently completed/updated: The *Howard and Moore Complete Checklist of the Birds of the World, 4th edition, Volume 1* (Dickinson & Remsen 2013) and *Volume 2* (Dickinson & Christidis 2014); The *HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1, Non-passerines* (del Hoyo *et al.* 2014), and *Volume 2, Passerines*, expected in 2016; *The Clements Checklist of Birds of the World, 6th edition* (Clements 2007) now updated online at < http://www.birds.cornell.edu/clementschecklist/>; and the online *IOC World Bird List* at < http://www.worldbirdnames.org/> (Gill & Donsker 2015). Each of these checklists has slightly different goals and taxonomic philosophies, and they can thus serve as an excellent view of the diversity of views on the family placement of any given species of bird.

Like a field guide, this book does not include formal bibliographic citations on details of life history and morphology, as more detailed information of this type is widely available in any of the excellent compendia on birds of the world at the species level. The most comprehensive source is the 16-volume *Handbook of the Birds of the World* edited by Josep del Hoyo *et al.* (Lynx Edicions, Barcelona). This huge hardcopy work has recently been joined by an online version, HBW Alive (<www.hbw.com>), which is the most immediate source available on all birds of the world. At the time of writing this volume, HBW Alive had not yet updated the taxonomy of all its content, pending publication of Volume 2 of the *Checklist*, but for the reader willing to pursue information at the species level, HBW Alive is a rich source that should be the first destination in any online search for information on birds. Regional guides with extensive information on individual species include the *Birds of North America* series (American Ornithologists' Union and Cornell Laboratory of Ornithology), available in many libraries or online at http://bna.birds.cornell.edu/bna/; the nine-volume *Birds of the Western Palearctic* edited by Stanley Cramp *et al.* (Oxford University Press) and available electronically as BWP*i* from BirdGuides (www.birdguides.com/bwpi/); the seven-volume *Birds of Africa* written by C. Hilary Fry, Stuart Keith, and Emil Urban (Princeton University Press); the seven-volume *Handbook of Australian, New Zealand and Antarctic Birds* written by a team from Birds Australia (Oxford University Press); the two-volume *The Birds of South America* by Robert S. Ridgely and Guy Tudor (University of Texas Press), which covers only the passerines of that continent, along with the new Neotropical Birds Online project, which will eventually cover all birds in the Neotropics (http://neotropical.birds.cornell.edu).

## Acknowledgments

This book has been a big part of the lives of the authors for the past five years, and many in our groups not listed here lent a hand or put up with delayed responses or reduced attention on account of this book. We thank all of them and hope the result was worth the distraction. David Winkler would like to thank especially his wife, Amy McCune, who cheerfully and supportively carved space for him, both at work and home, to allow him the manic attention that this work required in its final year. As a broadly accomplished evolutionary biologist and educator, Amy also served as a sounding board for our treatment of basal groups, for the presentation of taxonomic and biogeographic information and for the overall look of the book. Natasha Atkins brought her life-long love of birds to her role as Consulting Editor, helping us gain consistency and reasonableness in style and content. Her expert editorial hand has improved every page and paragraph. Teresa Pegan spent her entire undergraduate career working as Photo Coordinator for this book, and her excellent and ever-growing knowledge of the birds of the world, and their photographers, has helped us to find the best images available throughout and ensure accurate captions for each. She also used her expert skills in tackling numerous small details associated with getting to Lynx Edicions all the information they needed to publish the book. Barbara Page brought her artistic and discerning eyes to the emerging layout of the book, and she conceived and sketched a cover design that reshaped world geography in a bird-appropriate way. Reid Rumelt turned each of our rough-draft accounts into a standardized and streamlined version for the final editorial push. Eric Sibbald helped with captions, Brian Magnier helped with photos, Nicholas Sly gave us a valuable bird-lover's perspective on the layout, and Benjamin Barkley and Eric Gulson-Castillo went over the entire book looking for inconsistencies and errors. Thomas Schulenberg, Kenneth V. Rosenberg, Emma Greig, Daniel Baldassarre, Michael Webster, Kevin McGowan, and Theunis Piersma gave valuable feedback on drafts of accounts for families that they know especially well. Jon Fjeldså and his colleagues were very accommodating and flexible in working with us to get three bird family names officially described just in time for us to use them here.

The staff at Lynx Edicions has been a delight to work with. Amy Chernasky shepherded the project to very near the final stages, at which point, Ana Conesa seamlessly picked up the baton to take it across the finish line. Xavier Ruiz was flexible and creative in working with us to craft a layout that communicated the necessary information while bending to the various sizes and complexities of the families covered here, and his guidance helped us prepare maps that would be maximally useful. He adjusted a huge number of maps and photos according to our requests, all with a deft and proficient hand. Nigel Collar and, especially, Andy Elliot provided much helpful feedback about nomenclature.

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# Three new bird family names

By Jon Fjeldså[1], Per G. P. Ericson[2], Ulf Johansson[2], Dario Zuccon[3]

Over the last two decades, many molecular phylogenetic studies have provided robust evidence for the phylogenetic placement of species, or species groups, which had previously been difficult to place in the taxonomic hierarchy. Many of these have in the past been appended to larger family groups, although they may in fact represent ancient relictual forms with no close relatives. Separate family group names were in many cases suggested to flag their isolated position. Cracraft (2014) suggested that, in order not to lose taxonomic hierarchy, they should be included in a more inclusive family, provided that there was strong support for a sister group relationship. However, such a practice would lead to loss of information about the uniqueness of taxa that represent the last surviving relictual members of ancient radiations. We believe that, in case of an assemblage of several species or genera, each of which represents a lineage that is as old as, or older than, other species-rich family groups, we should accept each lineage of that assemblage to be an independent family (and we could then create taxonomic hierarchy of superfamilies, as exemplified by Alström *et al.* 2014 and Barker 2014). Jønsson *et al.* (2015) demonstrated, for the crow-like passerine birds (cohort Corvides), that the current family-level classification was largely consistent with 30 million years of divergence. Although this may differ somewhat among avian groups, we will argue that terminal branches, even if they include only a single extant species, should be recognized as a separate family if its genetic divergence is consistent with ages of related families, according to molecular phylogenies calibrated against fossils (Alström *et al.* 2014, Ericson *et al.* 2014, Selvatti *et al.* 2015).

For some such small families suggested in recent years, the suggested name was not presented in accordance with the International Code of Zoological Nomenclature. Here we provide formal family group names for three such taxa. The evidence will generally come from molecular phylogenetic studies, as these groups appear to be characterized mainly by morphological traits that are plesiomorphic within the assemblage of most closely related families.

## Chaetopidae Fjeldså *et al.* Fam. Nov.

*Chaetops*, the rock-jumpers of South Africa, have in most earlier classifications been placed in the family Timaliidae (often together with the warbler *Achaetops pycnopygius*), or in the Turdidae. Sibley and Ahlquist (1990) included *Chaetops* in DNA-DNA hybridization experiments with *Picathartes* and representatives of several species of the Corvida and Passerida cohorts; they found that the closest taxon to *Chaetops* was *Picathartes* and they were placed together in a family Picathartidae and Parvorder *incertae sedis*. Using nuclear and mitochondrial DNA sequences, Barker *et al.* (2004) and Beresford *et al.* (2005) recovered *Picathartes* and *Chaetops* as strongly supported sister-taxa in an ancient lineage that may have originated already in the Eocene (Ericson *et al.* 2014). Jønsson *et al.* (2007) expanded the analysis by adding the Oriental *Eupetes*, which was found to group with *Chaetops*, leaving *Picathartes* as a more distant relative. Cracraft (2014) proposed to include all three genera in a single family Eupetidae, but considering the Paleogene age of the *Picathartes-Chaetops-Eupetes* clade (Ericson *et al.* 2014), we find it more reasonable to assign the three genera to separate families (which can then be assembled in a superfamily Eupetoidea). Family name Chaetopidae has been mention for instance by Collar and Robson (2007) and Alström *et al.* (2014), but has not been formally named yet. Here we formally name the taxon:

**Chaetopidae, new family**
Type genus: *Chaetops* Swainson, 1832.

Diagnosis: The most inclusive crown clade that contain the two *Chaetops* species *frenatus* and *aurantius* (considered subspecies of one species by some), but not *Eupetes macrocercus*, *Picathartes gymnocephalus* and *P. oreas*, or *Achaetops pycnopygius*. Medium-sized (21-25 cm) insectivorous and petrophilous ten-primaried oscine passerine birds distributed in the south of Africa. Bill medium long, slightly decurved, legs and feet strong; tail fairly long and graduated, blackish with white feather tips, often held upright; plumage with streaked grayish upper parts and rusty rump and body underparts, and long whitish malar stripe. According to the available anatomic evidence, characterized by plesiomorphic characters such as a single cup-like humeral fossa and generalized oscine configuration of the syrinx (Olson 1984).

## Hylocitreidae Fjeldså *et al.* Fam. Nov.

The species *Hylocitrea bonensis* has had a convoluted taxonomic history, but until recently it was placed in family Pachycephalidae (Mayr 1967, Morony *et al.* 1975), without much supporting evidence other than a general similarity and presumably also guided by its distribution (Sulawesi) within the geographical range of the Pachycephalidae, which are well represented across the Malesian island region. Based on nuclear and mitochondrial DNA data, Spellman *et al.* (2008) placed it with strong support in the superfamily Bombycilloidea (with Dulidae, Bombycillidae, Ptiliogonatidae, Mohoidae, and Hypocoliidae), but with low support for a sister-group relationship with *Hypocolius* within that superfamily. Using additional markers and a complete species dataset, the *Hylocitrea-Hypocolius* clade became fully supported (Zuccon, unpublished), with basal divergences within the superfamily estimated to have taken place within a narrow time window around 30 Mya. Cracraft (2014) placed *Hylocitrea* as *incertae sedis* within the superfamily Bombycilloidea, but considering the age of divergence, we propose family rank. Alström *et al.* (2014) referred to Family Hylocitreidae, but without formally describing the family, which we here formally describe:

**Hylocitreidae, new family**
Type genus: *Hylocitrea* Mathews, 1925.

Diagnosis: The most inclusive crown clade that contains one species *Hylocitrea bonensis* with two distinctive subspecies (or allospecies, *bonensis* and *bothaina*), but not *Hypocolius ampelinus*, *Dulus dominicus*, *Bombycilla* spp., *Phainoptila melanoxantha*, *Phainopepla nitens*, *Ptilogonys* spp, *Moho* spp. or *Chaetoptila angustipluma*. Medium-sized (14-15 cm) ten-primaried oscine passerine inhabiting montane forests of Sulawesi, Indonesia; plumage mostly gray and olive-brown,

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with yellow-olive flanks and rump, resembling a diminutive female *Phainoptila melanoxantha* (unlike the more drab-gray *Hypocolius*); bill short, broad-based and slightly hooked and with short rictal bristles; legs short and feet small. By lack of anatomic specimens, no apomorphies have been identified, and external characters (including structure of plumage, bill and feet), frugivorous diet and high-pitched, buzzy vocalizations (Stresemann 1940) appear similar to other members of the Bombycilloidea assemblage.

## Modulatricidae Fjeldså *et al.* Fam. Nov.

Members of this group have had a tumultuous taxonomic history, being placed in various classifications as members of the Timaliidae *sensu lato*, Pycnonotidae or Turdidae. Using nuclear and mitochondrial DNA sequences, Johansson *et al.* (2008) demonstrated that *Modulatrix stictigula*, *Arcanator orostruthus*, and *Kakamega poliothorax* form a monophyletic group. Cracraft (2014) avoided erecting a family group for these three by placing them together with *Promerops* in the Promeropidae. This was justified by a strong support for monophyly based on RAG-1 and RAG-2 nuclear DNA (Barker *et al.* 2004, Beresford *et al.* 2005). However, RAG genes have given divergent results in some phylogenetic studies, and Johansson *et al.* (2008), adding other DNA markers, could not support this relationship. Further, the *Promerops* and *Modulatrix-Arcanator-Kakamega* lineages are estimated to have originated in the Oligocene (Alström *et al.* 2014), and before the divergence of the 26 other families in the Passeroidea radiation (sensu Barker 2014). The name Modulatricidae was mentioned (in quotation marks) by Fjeldså & Bowie (2008) and again by Alström *et al.* (2014). We here formally name the taxon:

**Modulatricidae, new family**
Type genus: *Modulatrix* Ripley, 1852.

Diagnosis: The most inclusive crown clade that contains the species *Modulatrix stictigula*, *Arcanator orostruthus* and *Kakamega poliothorax*, but not *Promerops cafer* or *gurneyi*. Medium-sized (15-19 cm) thrush-like passerine birds inhabiting the interior of Afromontane humid forest; feathering fine, close and dense, with uniform brownish dorsum and tail; further, the bill is fairly long, thin, and straight, rictal bristles reduced; legs long and feet large. We can confirm that details of tongue, jaw muscles, and structure of foot-pads, as described by Mann *et al.* (1978) for *Kakamega*, apply to all three species.

## References


**Alström, P., Hooper, D.M., Liu, Y., Olsson, U., Mohan, D., Gelang, M., Hung, L.M., Zhao, J., Lei, F. & Price, T.D.** (2014). Discovery of a relict lineage and monotypic family of passerine birds. *Biology Letters* **10(3)**: 20131067.

**Barker, F.K.** (2014). Mitogenomic data resolve basal relationships among passeriform and passeridan birds. *Molecular Phylogenetics and Evolution* **79(1)**: 313–324.

**Barker, F.K., Cibois, A., Schikler, P., Feinstein, J. & Cracraft, J.** (2004). Phylogeny and diversification of the largest avian radiation. *Proceedings of the National Academy Sciences of the United States of America* **101(30)**: 11040–11045.

**Beresford, P., Barker, F.K., Ryan, P.G. & Crowe, T.M.** (2005). African endemics span the tree of songbirds (Passeri): molecular systematics of several evolutionary 'enigmas'. *Proceedings of the Royal Society B*: **272**: 849–858.

**Collar, N.J. & Robson, C.** (2007). Family Timaliidae (babblers). Pp. 70–291 in del Hoyo, J., Elliott, A. & Christie, D.A. (Eds) *Handbook of the Birds of the World*. Vol. 12. Picathartes to Tits and Chickadees. Lynx Edicions, Barcelona.

**Cracraft, J.** (2014). Avian Higher-level Relationships and Classification: Passeriformes. Pp. xvii-xlv in: Dickinson, E.C. & Christidis, L. (Eds) *The Howard and Moore Complete Checklist of the Birds of the World*. 4th Edition, Vol. 2. Aves Press, Eastbourne, UK.

**Ericson, P.G.P., Klopfstein, S., Irestedt, M., Nguyen, J.M.T. & Nylander, J.A.A.** (2014). Dating the diversification of the major lineages of Passeriformes (Aves). *BMC Evolutionary Biology* **14**: 8.

**Fjeldså, J. & Bowie, R.C.K.** (2008). New perspectives on Africa's ancient forest avifauna. *African Journal of Ecology* **46**: 235–247.

**Johansson, U.S., Fjeldså, J. & Bowie, R.C.K.** (2008). Phylogenetic relationships within Passerida (Aves: Passeriformes): a review and a new molecular phygeny based on three nuclear intron markers. *Molecular Phylogenetics and Evolution* **48**: 858–876.

**Jønsson, K.A., Irestedt, M., Ericson, P.G.P. & Fjeldså, J.** (2007). Systematic placement of an enigmatic Southeast Asian taxon *Eupetes macrocercus* and implications for the biogeography of a main songbird radiation, the Passerida. *Biology Letters* **3**: 323–326.

**Jønsson, K.A., Fabre, P-H., Kennedy, J., Holt, P.G., Borregaard, M.K., Rahbek, C. & Fjeldså, J.** (2015). A supermatrix phylogeny of corvoid passerine birds (Aves: Corvides). *Molecular Phylogenetics and Evolution* **94**: 87–94.

**Mann, C.F., Burton, P.J.K. & Lennerstedt, I.** (1978). A re-appraisal of the systematic position of *Trichastoma poliothorax* (Timalidae, Muscicapida). *Bulletin of the British Ornithologists' Club* **98**: 131–149.

**Mayr, E.** (1967). Family Muscicapidae, subfamily Pachycephalinae. Pp. 31–51 in Paynter, R.A. ed. *Check-list of Birds of the World*. Museum of Comparative Zoology, Cambridge, Massachusetts.

**Morony, J.J., Bock, W.J. & Farrand, J. Jr.** (1975). *Reference List of the Birds of the World*. Department of Ornithology, American Museum of Natural History, New York.

**Olson, S.L.** (1984). Syringeal morphology and relationships of *Chaetops* (Timaliidae) and certain South African Muscicapidae. *Ostrich* **55**: 30–32.

**Selvatti, A.P., Gonzaga, L.P. & de Moraes Russo, C.A.** (2015). A Paleogene origin for crown passerines and the diversification of the Oscines in the New World. *Molecular Phylogenetics and Evolution* **88**: 1–15.

**Sibley, C.G. & Ahlquist, J.E.** (1990). *Phylogeny and Classification of Birds. A Study in Molecular Evolution*. Yale University Press, New Haven & London.

**Spellman, G., Cibois, A., Moyle, R., Winkler, K. & Barker, F.K.** (2008). Clarifying the systematics of an enigmatic avian lineage. What is a Bombycillid? *Molecular Phylogenetics and Evolution* **49**: 2036–2040.

**Stresemann, E.** (1940). Die Vögel von Celebes. Teil III, 1 (Passeres). *Journal of Ornithology* **88**: 1–135.


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# Order: STRUTHIONIFORMES

## Families: Struthionidae, Rheidae, Tinamidae, Casuariidae, Apterygidae

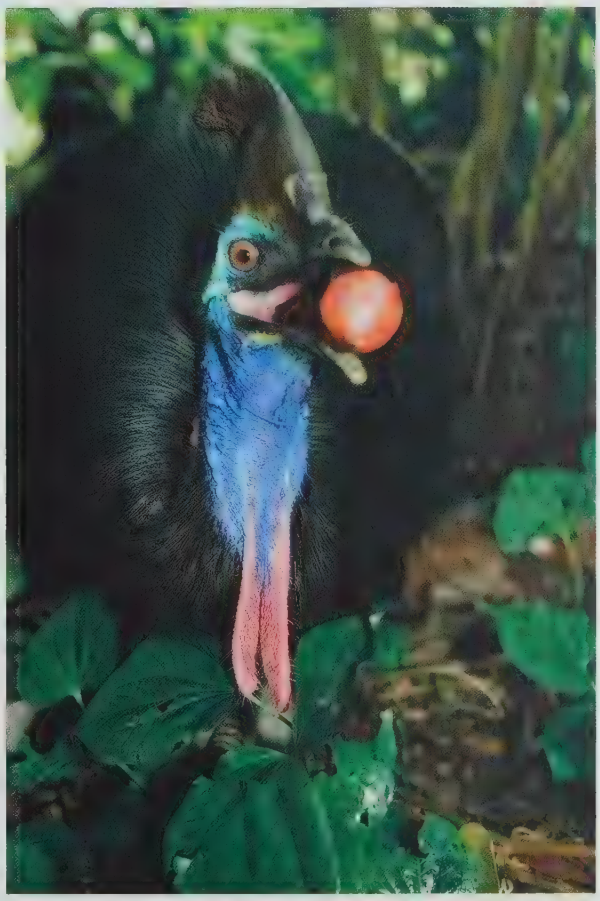
Traditionally, Struthioniformes has included only the ratites, a group of large flightless birds including ostriches (Struthionidae), Emu and cassowaries (Casuariidae), rheas (Rheidae), and kiwis (Apterygidae). This group also included two recently extinct families, moa (Dinornithidae) of New Zealand and elephantbirds (Aepyornithidae) of Madagascar. This latter family included what was likely the heaviest bird ever to have lived, standing at 3 m tall. One of the key morphological features that unites the ratites is a flat raft-like sternum, lacking the deep keel present in the sterna of other birds. Although there have been debates as to monophyly, loss of flight, and relative position of the ratites with respect to other birds, most authors agreed until recently that they represent a monophyletic group with a single evolutionary origin of flightlessness. Under this view, Struthioniformes has been a leading example of a possible Gondwanan origin of bird groups, with the different families on the southern land masses representing vicariance events caused by the drifting apart of the southern supercontinent of Gondwana (Cracraft 1974).

Recently, however, the phylogenetic relationships within Struthioniformes, and their implications for the origin, age, and evolution of the group, have been the source of much debate. Molecular studies have shown that tinamous (Tinamidae), traditionally regarded as being in an order of their own, should actually be included within Struthioniformes. This has important implications, including multiple losses of flight in the group; it also brings together all birds that have what is known as a paleognathous palate, a distinctive trait shared by tinamous and ratites. Within Struthioniformes, it appears that Struthionidae is sister to all other members of the group (Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010). Outside of that, there is less agreement, although Apterygidae and Casuariidae generally group together. The exact placement of Tinamidae is less clear, with some finding it sister to Rheidae, some to the clade that includes Apterygidae and Casuariidae (Hackett *et al.* 2008), and others finding it sister to the extinct Dinornithidae (Harshman *et al.* 2008, Phillips *et al.* 2010).

Molecular dating methods have also indicated that Struthioniformes is younger than the breakup of the southern supercontinent of Gondwana (Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010). This, together with revisions of the most likely relationships within the group and their fossil records, presents problems for the traditional biogeographic explanation of divergence in the group. In particular, although a Gondwanan origin is supported for most of the order, a northern origin for Struthionidae cannot be ruled out (Phillips *et al.* 2010). It is also possible that flight-assisted dispersal and subsequent loss of flight contributed to the patterns we see today (Harshman *et al.* 2008, Phillips *et al.* 2010).



Common Ostrich, *Struthio camelus*.
Masai Mara Game Reserve, Kenya. © Kevin Schafer.



Southern Cassowary, *Casuarius casuarius*.
Atherton Tablelands, Queensland, Australia. © Kevin Schafer.

Struthioniformes

## STRUTHIONIDAE
Ostriches

1 genus • 2 species

**Related Families** Rheidae (rheas), Casuariidae (Emu and cassowaries), Apterygidae (kiwis), Tinamidae (tinamous)

**Similar Birds** Rheas (Rheidae), Emu (Casuariidae)

**Description**
- Plumage soft and loose-barbed
- Remiges and rectrices reduced to ornamental function
- Body very large, ovoid, with horizontal carriage
- Bill short, broad, and flat
- Head small and bare with large eyes; neck long with minimal feathers
- Legs long, very robust, bare up through thighs; feet non-grasping with two thickened toes
- Males larger than females; plumage mostly black in males with white in wings, grayish brown in females

**Habitat** Ostriches live in open, relatively arid regions including open woodland, savanna, and semi-desert.

**Food** Primarily herbivorous, with a preference for green plants, ostriches will, unlike mammals, eat the entire plant (roots and all), presumably as a source of water. Like other animals that live in arid environments, ostriches employ various means to conserve water and spend a large proportion of each day foraging.

**Breeding** Ostriches are polygamous; an individual male will mate with many females in one season, and females also mate with multiple males. Multiple females (up to 18) will lay their eggs in a single nest, a simple indentation in the ground scraped out by the male in an area with good visibility. The "major" female lays her eggs first, typically 7 to 10 eggs, and is then followed by the "minor" females. A single nest usually contains 20 to 25 eggs. Only the male and the "major" female contribute to care of the chicks. Both male and female incubate the eggs over a six-week incubation period, and both help raise the chicks. Three days after hatching, the chicks leave the nest and follow their parents, remaining with them for up to 12 months. In some cases, when family groups with chicks come into contact, one pair ends up with both broods after a brief chase, and some pairs end up with up to 300 chicks as a result of such encounters.

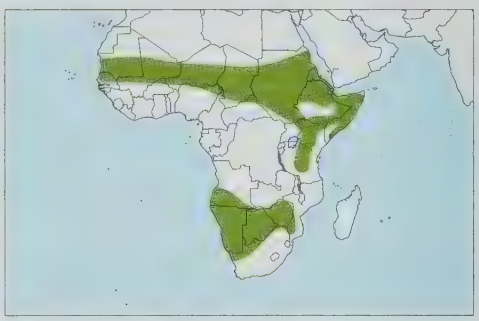


Common Ostrich, *Struthio camelus*.
Masai Mara Game Reserve, Kenya. © Kevin Schafer.

**Conservation** One ostrich species (50%) faces some conservation concern (1 VU). Historically, however, ostriches were hunted for their meat, feathers, and leather, and they have experienced drastic declines and range contractions. One subspecies of the Common Ostrich, *Struthio camelus syriacus* of the Middle East, went extinct around 1966.

**Relationships** Struthionidae is part of the ratite radiation. Relationships among ratites and tinamous (Tinamidae) have long been controversial (Sibley & Ahlquist 1990, van Tuinen *et al.* 1998, Livezey & Zusi 2007), but a series of recent, independent molecular studies have consistently placed Struthionidae as sister to the remaining ratites plus tinamous (Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010).





By far the largest living birds in the world in both height and weight, ostriches are also the fastest on land. With only two toes on their feet and extremely muscular legs, ostriches are like the antelopes of the bird world, adapted for a running existence in the savannas of Africa, attaining speeds of more than 70 km per hour. Males do most of the parental care, incubating eggs laid in a communal nest by the females in their harems. Although the eggs are the largest in the world, relative to the size of the laying female, they are the world's smallest. Ostrich eggs and chicks are subject to high levels of predation, but in captivity ostriches are among the longest-lived birds.



Somali Ostrich, *Struthio molybdophanes*. Aledeghe Plains, Ethiopia. © Luke Seitz.

*STRUTHIO*
2 species



*S. camelus*
Common Ostrich

Struthioniformes

## RHEIDAE
Rheas

1 genus • 3 species

**Related Families** Struthionidae (ostriches), Casuariidae (Emu and cassowaries), Apterygidae (kiwis), Tinamidae (tinamous)

**Similar Birds** Ostriches (Struthionidae), Emu (Casuariidae)

**Description**
- Plumage gray and brown, soft and lax
- Wings short; rectrices absent
- Body very large, ovoid, with horizontal carriage
- Bill short, wide, and flat
- Head small; neck long
- Legs long, very robust; feet non-grasping with three toes
- Females larger than males; sexes similar in appearance

**Habitat** Rheas live in open, usually drier habitats, including grasslands at both low and high elevations, tropical savanna, and open woodland.

**Food** Rheas are omnivorous and feed on a wide variety of plants and animals: fruits, nuts, seeds, leaves, arthropods, and small vertebrates, including mammals, reptiles, and fish.

**Breeding** Rheas are polygynandrous. Males construct the nest, a rough depression in the ground that is often lined with dried vegetation, and they segregate harems of females from larger social groups to court, associating with them in the vicinity of the nest until the large clutch is complete. Individual females lay up to 14 eggs, and a single male's nest can contain up to 60 eggs. Females often travel in groups from one male's harem to another's. The male incubates the eggs alone for 35 to 40 days and provides all parental care. After chicks are a few days old, they leave the nest with the male and may remain with him for at least six months, but will often stay longer, leaving only when they reach sexual maturity at three years of age.



Lesser Rhea, *Rhea pennata*.
Magallanes, Patagonia, Chile. © Mark A. Chappell.

**Conservation** Two species of *Rhea*, *R. americana* and *R. tarapacensis*, have seen rapid population declines throughout their ranges due to hunting, egg collection, and habitat destruction and alteration; both (67%) are of conservation concern (2 NT).

**Relationships** The rheas fall within the order that unites the ratites and Tinamidae. Although relationships within Struthioniformes remain controversial, in many recent studies Rheidae has been found to be sister to a group that includes all struthioniform families except the ostriches (Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010).



Lesser Rhea, *Rhea pennata*. Magallanes, Patagonia, Chile. © Nick Athanas.





Rheas are the largest birds in South America and are common residents of open grasslands or croplands throughout the southern part of the continent. Though endowed with excellent running ability, rheas usually saunter away long before a visitor draws too close. If left in peace, they will slowly graze through an area, searching for anything edible, animal or vegetable, at a pace less than a human's slow walk. Males incubate the eggs laid in their nests by multiple females, and after hatching, the chicks forage in the grass, accompanied by their father until gradually reaching their independence about seven months later.

*RHEA*
3 species



*R. americana*
Greater Rhea

Struthioniformes

# TINAMIDAE
## Tinamous

9 genera • 48 species

**Related Families** Casuariidae (Emu and cassowaries), Rheidae (rheas), Struthionidae (ostriches), Apterygidae (kiwis)

**Similar Birds** Grouse (Phasianidae), megapodes (Megapodiidae), rails (Rallidae)

**Description**
- Plumage generally brown and gray, with cryptic barring, spots, and streaking
- Wings short, rounded; tail very short
- Body small to medium, fusiform ovoid, with distinctly down-swept tail
- Sternum keeled with deep lateral fenestrae
- Bill broad to slender, decurved slightly in most species
- Head small; neck medium-long
- Legs short, thick; toes short with hallux elevated or lacking
- Females larger than males; sexes similar in appearance

**Habitat** Tinamous live in a wide range of habitats, from dense rainforest to arid grasslands, and from sea level to high mountains. They spend most of their time on the ground, and their home ranges generally include at least some dense cover.

**Food** Tinamous primarily feed on plant matter, including fruit, seeds, leaves, and the buds of plants, but they will also eat insects and other arthropods. They generally only take food that is lying on the ground; however, they have been known to jump above-ground for fruit or insects, to scratch at the ground to uncover food, and to follow livestock in search of insects in their wake.

**Breeding** It appears that all tinamous are polygynandrous: males mate with several females and females with several males in the same season. Although all tinamous nest on the ground well hidden under dense vegetation, nest structure appears to vary by species, ranging from a scrape in the ground to a nest of woven grass. With the exception of the one tinamou species that lays a single egg each breeding season, it is difficult to determine how many eggs individual females of most other species lay, since many females lay eggs in the same nest, where up to 16 eggs may be found. Only male tinamous incubate and care for the chicks. The precocial chicks hatch after 16 to 20 days and are able to run and forage hours after hatching. By 16 to 20 days post-hatch, the chicks apparently become



Elegant Crested Tinamou, *Eudromia elegans*. Valdés Peninsula, Argentina. © Nick Athanas.





Rarely seen but frequently heard, the elusive tinamous make their presence known through their whistled calls—sounds that are part of the daily chorus of just about every terrestrial habitat in the Neotropics. Tinamou nests, which often contain eggs laid by multiple females, are tended solely by males. The eggs are like hidden treasures, with each species having a different color, ranging from sky blue, purple, or olive, to deep brown or dark gray, and all having the shiny luster of fine porcelain. Unlike their other relatives in the Struthioniformes, tinamous are capable of flight, though they are labored and reluctant fliers.



Tataupa Tinamou, *Crypturellus tataupa*. Calilegua NP, Argentina. © Ian Davies.

independent and the males are able to breed again. Often, older males, more successful in attracting mates, will raise chicks from multiple females in mixed broods.

**Conservation** Most tinamid species are of no immediate conservation concern, as many populations are fairly large and widespread; however, 14 species (29%) face some level of conservation concern (7 NT, 7 VU). These are mostly species with limited ranges that are experiencing persistent habitat destruction.

**Relationships** Tinamidae has traditionally been thought to be sister group to the non-flying ratites, with tinamous most often placed in a separate order, Tinamiformes. This arrangement had substantial support from previous phylogenetic and morphological studies (Sibley & Ahlquist 1990, van Tuinen *et al.* 1998, Livezey & Zusi 2007). However, several more recent studies have suggested a strikingly different pattern, in which Tinamidae is instead embedded well within the ratite radiation (Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010). This new placement has important implications for understanding the early evolution of living birds, as it suggests that the various ratites lost the ability to fly multiple times, rather than just once in a single common ancestor.



Ornate Tinamou, *Nothoprocta ornata*. Near Tarma, Junín, Peru. © Luke Seitz.

*NOTHOCERCUS*
3 species



*N. bonapartei*
Highland Tinamou

*TINAMUS*
5 species



*T. solitarius*
Solitary Tinamou

*CRYPTURELLUS*
22 species



*C. erythropus*
Red-legged Tinamou

*RHYNCHOTUS*
2 species



*R. rufescens*
Red-winged Tinamou

*NOTHOPROCTA*
6 species



*N. ornata*
Ornate Tinamou

*NOTHURA*
5 species



*N. minor*
Lesser Nothura

*TAONISCUS*
1 species



*T. nanus*
Dwarf Tinamou

*EUDROMIA*
2 species



*E. formosa*
Quebracho Crested Tinamou

*TINAMOTIS*
2 species



*T. ingoufi*
Patagonian Tinamou

Struthioniformes

## CASUARIIDAE

Emu and Cassowaries

2 genera • 4 species

**Related Families** Apterygidae (kiwis), Tinamidae (tinamous)

**Similar Birds** Ostriches (Struthionidae), rheas (Rheidae)

**Description**

- Plumage grayish brown, soft, and mop-like in Emu, black, stiff, and hair-like in cassowaries;
- Face and neck bare with short, stiff bristle-like feathers on cap and nape in Emu; head featherless with a prominent casque in cassowaries; neck mostly bare in both
- Long aftershafts in the feathers of both, with no interlocking hooks on widely separated barbs, giving feathers a loose structure
- Remiges virtually absent in Emu and only five or six bare shafts in cassowaries; rectrices absent in both
- Body very large, fusiform ovoid, with horizontal carriage
- Bill short and flat in Emu; bill medium length, pointed, and deep in cassowaries
- Head small; neck long
- Legs long and thick; feet three-toed, the innermost toe featuring a long, sharp claw in cassowaries
- Females larger with more brightly colored bare facial skin

**Habitat** Emus inhabit open, arid habitats, from grasslands to open woodlands. Cassowaries occupy wetter, denser habitats, from rainforests to savanna woodlands.

**Food** Emus are omnivorous, feeding on a variety of plants, including leaves, fruits, seeds, and roots, as well as insects and other invertebrates. Cassowaries are primarily frugivorous and generally eat fruit that has fallen on the ground; however, they occasionally eat insects and small vertebrates.



Southern Cassowary, *Casuarius casuarius*. Atherton Tablelands, Queensland, Australia. © Kevin Schafer.



**Breeding** Emus and cassowaries are monogamous to polyandrous, with females mating and laying several clutches with up to several different males. The nests of Emus and cassowaries consist of shallow depressions in the ground that are lined with leaves and grass and are built by males before courting begins. Female Emus lay large clutches of 5 to 15 eggs, whereas female cassowaries lay 3 to 5 eggs per clutch. After a female lays eggs in the male's nest, it leaves that male in search of another mate. The male incubates the eggs alone for seven to eight weeks and cares for the chicks for up to nine months after hatching, protecting them

The Emu is the pervasive large ground bird of open habitats in Australia, and cassowaries dwarf all other birds in the understory of humid forests in northeastern Australia and New Guinea. As in most others of this order, the males care for the eggs and chicks without any aid from the female. Cassowaries bear a dagger-like claw on their second toes, and both they and Emus can defend their chicks with a kick and a slash. Both groups have bare facial skin that is brightly colored, with cassowaries also sporting a flexible casque on top of the head and colored wattles low on the neck. These birds are also the only ones thought to routinely use infrasound in communication.



Common Emu, *Dromaius novaehollandiae*. Flinders Ranges NP, South Australia. © Drew Fulton.

from predators and showing them sources of food, which the chicks actively take shortly after hatching. Young finally become sexually mature after about one and one-half to two years.

**Conservation** With a status of least concern, Emus are not currently threatened; however, the three species of cassowaries are currently in decline (1 NT, 2 VU), owing to habitat destruction and degradation, hunting, and predation from introduced mammalian predators such as feral pigs.

**Relationships** Although the relationships of Casuariidae with the other ratites and tinamous have long been controversial, the grouping of Emu and cassowaries as sister lineages within the same family has broad support from studies of disparate morphological and genetic characters (Sibley & Ahlquist 1990, van Tuinen *et al.* 1998, Hackett *et al.* 2008, Harshman *et al.* 2008, Phillips *et al.* 2010, Livezey & Zusi 2001, 2007). Recent genetic work generally supports a sister relationship with Apterygidae; however, relationships with other struthioniforms cannot be ruled out (Phillips *et al.* 2010).



Southern Cassowary, *Casuarius casuarius*. Queensland, Australia. © Kevin Schafer.

### Subfamily CASUARIINAE

*CASUARIUS*
3 species



*C. unappendiculatus*
Northern Cassowary

### Subfamily DROMAIINAE

*DROMAIUS*
1 species



*D. novaehollandiae*
Common Emu

Struthioniformes

## APTERYGIDAE
Kiwis

1 genus • 5 species

**Related Families** Casuariidae (Emu and cassowaries), Struthionidae (ostriches), Rheidae (rhea), Tinamidae (tinamous)

**Similar Birds** Rails (Rallidae)

**Description**
- Plumage mostly brown and hair-like
- Wings rudimentary; rectrices absent
- Body small to medium, round ovoid, with front-heavy profile
- Bill long and slender with nostrils near tip
- Head small with small eyes and many long, bristle-like feathers on face; neck thick and short compared to other ratites
- Legs short, thick; toes thick with well-developed claws for digging
- Sexes similar

**Habitat** Kiwis inhabit primarily wet forests, typically temperate rainforests, but will venture into subtropical rainforest, scrubland, and grassland where soils are light enough for digging burrows and foraging.

**Food** Kiwis feed primarily on worms and other invertebrates such as beetles, crickets, spiders, and moths. They sometimes take small amounts of plant material, including fruit and leaves, which may be ingested unintentionally. Kiwis mostly rely on their keen senses of smell and touch to probe for food with their bills.

**Breeding** Unlike other ratites, kiwis are monogamous with long-lasting pair bonds. They nest in self- excavated burrows in steep banks, which are often left unoccupied for several months after excavation, which allows covering vegetation to grow around the entrance. Females typically lay 1 or 2 very large eggs, probably investing as much as other ratites in eggs laid, but in a much smaller clutch. Although the incubation behavior of kiwis varies depending on the species, males of all four species exert more effort in the process than females. Some males incubate unassisted, whereas others are assisted by up to five other adult male helpers, which develop brood patches to help incubate eggs they did not father. The chicks hatch after two to three months of incubation, and they are generally brooded by the male but feed themselves. Chicks are independent after about three weeks of age, although they remain in their parents' territory for several months.



Northern Brown Kiwi, *Apteryx mantelli*.
Little Barrier Island, New Zealand. © Simon Fordham / NaturePix.



**Conservation** All apterygid species (100%) face some level of conservation risk (1 NT, 2 VU, 2 EN). Kiwis are currently declining rapidly from habitat destruction and the introduction of mammalian predators. Once widespread, the Little Spotted Kiwi *Apteryx owenii* was nearly eradicated, and is now found only in predator-free locations where birds have been released. Although it has the smallest population of the five kiwi species, *A. owenii* was recently downlisted to near-threatened status because of the success of these intensively managed populations.

**Relationships** Apterygids fall within the ancient ratite radiation that is sister to all other living birds. The most recent morphological studies suggest that apterygids are sister to ostriches (Livezey & Zusi 2007). In contrast, a series of molecular phylogenetic studies have consistently placed kiwis sister to Casuariidae (Sibley & Ahlquist 1990, van Tuinen *et al.* 1998, Hackett *et al.* 2008, Harshman et al. 2008, Phillips *et al.* 2010).

Kiwis are perhaps the birds that most resemble mammals. They have a mammal-like body temperature, poor vision, almost no wings, and non-feathery, hair-like plumage. Their excellent sense of smell is tied to nostrils and numerous nerve-endings at the end of a long flexible bill, which they use to probe for prey in the undergrowth and duff of New Zealand forests. Kiwis are also quite adept at catching aquatic prey, and the fleshy valves on these nostrils appear to serve the birds well when they forage in forest streams. Kiwis are nocturnal and nest in self-excavated underground tunnels, and the females lay proportionally the largest egg of any bird. In most species, only males incubate, and helpers sometimes assist.



Southern Brown Kiwi, *Apteryx australis*. Stewart Island, New Zealand. © B. G. Thomson.

*APTERYX*
5 species



*A. owenii*
Little Spotted Kiwi

# Order: GALLIFORMES

## Families: Megapodiidae, Cracidae, Numididae, Odontophoridae, Phasianidae

Galliforms are a diverse assemblage of largely ground-dwelling birds, sometimes also referred to as game birds. The order Galliformes includes the megapodes (Megapodiidae), guans (Cracidae), guineafowls (Numididae), New World quails (Odontophoridae), and pheasants and allies (Phasianidae). Galliformes is sister to Anseriformes, and together they form the clade known as Galloanserae, an ancient radiation that is likely sister to all other modern birds outside the ratites (Ericson *et al.* 2006a, Hackett *et al.* 2008, Eo *et al.* 2009).

Galliformes has consisted of three to seven families in the past (Cracraft 1981, del Hoyo *et al.* 1994, Kriegs *et al.* 2007, Hackett *et al.* 2008, Eo *et al.* 2009, Kimball *et al.* 2011). Within the order, the megapodes appear to be sister to the remaining members of Galliformes. Phasianidae has a close relationship with Numididae and Odontophoridae, and sometimes all are placed in a single family (e.g., Cracraft 1981). Among these three families, Odontophoridae seems to be sister to Phasianidae (Kriegs *et al.* 2007, Hackett *et al.* 2008, Cohen *et al.* 2012, Kimball *et al.* 2011, Wang *et al.* 2013). In most studies, Cracidae is sister to these three families, with the megapodes sister to all four (Ericson *et al.* 2006a, Hackett *et al.* 2008, Kimball *et al.* 2011, Wang *et al.* 2013).



Bare-faced Curasow, *Crax fasciolata*. Rio Pixaim, Pantanal, Brazil. © Nick Athanas.



Siamese Fireback, *Lophura diardi*. Phu Khiao, Thailand. © Con Foley.

# MEGAPODIIDAE
## Megapodes

7 genera • 21 species

**Related Families:** Cracidae (guans); Cumulidae (guineafowls)

**Similar Birds:** Pheasants (Phasianidae); guans (Cracidae); guineafowls (Cumulidae)

**Description**
- Plumage generally black or brown, a few with contrasting accents or patterns
- Wings short and rounded; tail moderate to short in length
- Body ovoid to fusiform; mid-sized, generally similar to domestic fowl in both size and shape
- Bill short and often slightly decurved, with overlapping tip
- Head small, colored casques and/or bare facial skin or wattles in some species
- Legs thick; feet very large and toes thick with long claws
- Sexes generally similar; males on average slightly larger and more brightly colored

**Habitat:** Megapodes mostly inhabit lowland tropical forest and forest edges, with only the Malleefowl *Leipoa ocellata* living in arid woodland and scrubland.

**Food:** The diet of megapodes includes leaves, seeds, berries, buds and a wide variety of invertebrates (insects, worms, snails, centipedes, etc.). Some megapodes are even known to eat small vertebrates, such as lizards.

**Breeding:** Unlike any other bird, megapodes construct a nest that provides heat to the developing eggs without any transfer of heat from the parent's body. To accomplish this, the male builds its nest in the form of a mound or a burrow, depending on the species. Building and maintaining nests requires an exorbitant amount of time and energy, particularly from the mound-building megapodes, which may spend up to 11 months every year tending to their mounds. Eggs laid in mounds rely on heat generated from the breakdown of organic material around them (supplemented by dry-season solar heating in the mounds of *Leipoa*). The male adds and removes material to and from the mound to regulate decomposition and the temperature of incubation. Eggs in burrows rely on geothermal heat, solar radiation on black overlying sands, or decomposing adjacent tree roots. Many burrow-nesting megapodes tend to the burrow during the incubation period.



Malleefowl, *Leipoa ocellata*
Hamilton Nature Reserve, Victoria, Australia © Steve Fulton



These chicken-like Australasian birds, whose name means "big foot" in Greek, use their powerful feet to burst out of the shell. The newly hatched chicks then dig up through overlying warm material to emerge into the open air. With wings fully feathered, the young of many species can fly soon after hatching, and they most likely never see their parents as they set out for a life on their own. This is not to say that their parents have been indolent. The males of many species invest enormous energy in preparing and maintaining a nest that will warm the eggs, and the female produces very large eggs that produce the most precocial young of any bird.



Males *Macrocephalon maleo* Sulawesi © Frank Schulze

however, in some species, such as the Maleo *Macrocephalon maleo*, both parents permanently leave the nest after the eggs are laid and buried. Female megapodes lay 8 to 30 very large eggs, the embryos within which take 50 to 100 days to develop. Chicks are independent once they hatch and require no parental care: they are the most precocial chicks of any bird, and chicks of many species can fly as soon as they emerge from the mound or burrow. The mating systems of megapodes appear to be diverse, though the fact that females never linger at the nest, and only visit there to lay their eggs, makes genetic reconstruction of parentage very difficult.

**Conservation** Hunting, egg collecting, and habitat destruction and fragmentation are responsible for the declines of 11 megapode species (52%; 1 NT, 6 VU, 4 EN). The endangered Maleos *M. maleo* have experienced particularly drastic population declines; their large communal nest burrows are used year after year, making them an easy target for egg harvesting by humans. The remaining endangered megapodiids are all small-island endemics with small populations unable to sustain large declines.

**Relationships** Some earlier studies placed Megapodiidae in a separate order (Craciformes) along with Cracidae (Sibley & Ahlquist 1990). Current evidence, both morphological and molecular, suggests that the megapodes and allies form the sister group to the remaining four families in Galliformes (Ericson *et al.* 2006a, Cox *et al.* 2007, Livezey & Zusi 2007, Hackett *et al.* 2008, Kimball & Braun 2008, Eo *et al.* 2009, Kimball *et al.* 2011, Wang *et al.* 2013).



Orange-footed Scrubfowl, *Megapodius reinwardt*. Brisbane, Australia. © John McKean.

*ALECTURA*
1 species



*A. lathami*
Australian Brush-turkey

*AEPYPODIUS*
2 species



*A. arfakianus*
Wattled Brush-turkey

*TALEGALLA*
3 species



*T. jobiensis*
Collared Brush-turkey

*LEIPOA*
1 species



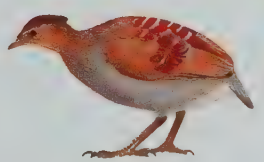
*L. ocellata*
Malleefowl

*MACROCEPHALON*
1 species



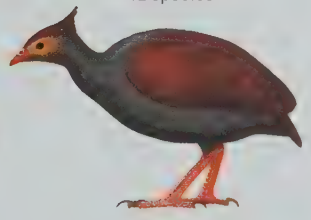
*M. maleo*
Maleo

*EULIPOA*
1 species



*E. wallacei*
Moluccan Scrubfowl

*MEGAPODIUS*
12 species



*M. reinwardt*
Orange-footed Scrubfowl

Galliformes

# CRACIDAE
Guans

11 genera • 56 species

**Related Families** Numididae (guineafowls), Phasianidae (pheasants and allies), Odontophoridae (New World quails)

**Similar Birds** Pheasants (Phasianidae), brushturkeys (Megapodiidae)

**Description**
- Plumage often unpatterned, brown or glossy black; black feathers with bold white or rufous accents in many species of curassows and guans
- Wings short and rounded; tail broad, long, graduated
- Body ovoid, slimmest in chachalacas, most robust in curassows; medium-sized
- Bill heavy, short, and pointed; bill top with distinct colored knob in curassows; cere sometimes bare and colorful
- Neck long and head small with crest formed by modified feathers in curassows and some guans; head with tall, red, bare horn in the Horned Guan *Oreophasis durbianus*, and a variety of casques in others; lores, throat, and wattles often bare and colorful
- Legs thick; feet large, with hallux on same level as other toes
- Sexes similar in most species; male curassows usually mostly black; female curassows typically browner, more finely and cryptically patterned; Highland Guan *Penelopina nigra* only species in which females larger

**Habitat** Cracids occupy a wide variety of habitats, including tropical lowland rainforest, arid scrub, and montane forest. Curassows and guans spend time on the ground, but most cracids are primarily arboreal.

**Food** Cracids feed on a wide variety of fruits, seeds, leaves, and flowers with a small proportion of insects.

**Breeding** The breeding biology of the cracids is still poorly understood. Most were long thought to be monogamous, though some of the curassows and guans now appear to be polygynous. Cracid nests are typically platforms made of sticks, leaves, vines, and other vegetation; rarely are nests placed on the ground. Nests often appear flimsy and too small for the large birds that make them. Both male and female cracids construct the nest, although males are usually observed building the majority of the time. Cracids typically lay 1 to 4 eggs, and only the female incubates. Male roles in parental care vary: most curassow and guan males do little if anything for the chicks, but chachalaca males participate fully in their care. The chicks hatch synchronously after 24 to 34 days of incubation and are quite precocial at hatching, most leaving the nest and clambering around in branches within a couple days of hatching. Most are fluttering among branches within a few days more. The chicks are fed at first by the parents, but gradually feed themselves more and more, finally reaching independence months after hatching.

**Conservation** Habitat destruction across Central and South America poses a major threat,



Great Curassow, *Crax rubra*.
La Selva Biological Station, Costa Rica. © Alex Vargas.





Cracids are large and elegant birds of Neotropical woodlands and forests. Highly prized as game fowl, they are often the first birds to disappear once "civilization" has arrived. As a result, they tend to be quite shy, and encountering a lingering curassow on a forest trail can be the highlight of any morning afield. With a diversity of body shapes, the silhouettes of many species are accented by intricate crests or strange horns or casques. The calls and noises produced by these birds, from the syncopated cacophony of chachalacas at dawn to the strange night-time booms and mechanical rattles of guans, are a major part of the soundscape in all Neotropical woodlands.



Razor-billed Curassow, *Mitu tuberosum*. Cristalino Jungle Lodge, Mato Grasso, Brazil. © Nick Athanas.

but hunting is probably most responsible for population declines in 28 cracid species (50%; 5 NT, 9 VU, 7 EN, 6 CR, 1 EW). There is hope that the Alagoas Curassow *Mitu mitu*, which survives only in captivity, will eventually be reintroduced. Critically endangered species include Blue-billed Curassow *Crax alberti* (found in several widely separated locations in Colombia), Trinidad Piping-guan *Pipile pipile* (endemic to a small fragment of forest in Trinidad), and White-winged Guan *Penelope albipennis* (found in a narrow range of dry forest in Peru).

**Relationships** Cracids have long been considered to be a particularly ancient group (Craraft 1981). Recent studies suggest that Cracidae is probably sister to a clade that includes Numididae, Odontophoridae, and Phasianidae (Dimcheff *et al.* 2002, Dyke *et al.* 2003, Hackett *et al.* 2008, Kimball & Braun 2008, Kimball *et al.* 2011, Wang *et al.* 2013). Within Cracidae, the position of Oreophasinae is not well resolved, but it may be sister to the clade made up of Cracinae plus Ortalisinae (Pereira & Baker 2004, Kimball *et al.* 2011), and Penelopinae appears to be sister to the remaining three (Pereira & Baker 2004).



Rufous-headed Chachalaca, *Ortalis erythroptera*. Buenaventura Reserve, Ecuador. © Francesco Veronesi.

## Subfamily PENELOPINAE

*CHAMAEPETES*
2 species



*C. goudotii*
Sickle-winged Guan

*PENELOPINA*
1 species



*P. nigra*
Highland Guan

*PENELOPE*
15 species



*P. jacquacu*
Spix's Guan

*PIPILE*
5 species



*P. cujubi*
Red-throated Piping-guan

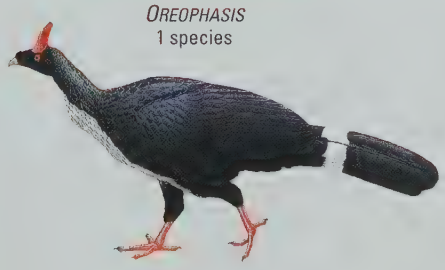
## Subfamily OREOPHASINAE

*ABURRIA*
1 species



*A. aburri*
Wattled Guan

*OREOPHASIS*
1 species



*O. derbianus*
Horned Guan

## Subfamily ORTALISINAE

*ORTALIS*
15 species



*O. vetula*
Plain Chachalaca

## Subfamily CRACINAE

*NOTHOCRAX*
1 species



*N. urumutum*
Nocturnal Curassow

*CRAX*
8 species



*C. daubentoni*
Yellow-knobbed Curassow

*MITU*
4 species



*M. mitu*
Alagoas Curassow

*PAUXI*
3 species



*P. pauxi*
Helmeted Curassow

Galliformes

# NUMIDIDAE
## Guineafowls

4 genera • 8 species

**Related Families** Phasianidae (pheasants and allies), Odontophoridae (New World quails), Cracidae (guans)

**Similar Birds** Pheasants and turkeys (Phasianidae), curassows and guans (Cracidae)

**Description**
- Plumage black with sharply contrasting fine white or blue spots or stripes
- Wings short, rounded; tail short
- Body medium-sized, ovoid, often with an upright carriage and downsloped rump and tail
- Bill medium length, stout, and slightly decurved
- Head largely unfeathered, in some species with brightly colored comb, wattles, or crest; neck long and most often bare on top half
- Legs thick and medium-long with tarsal spur in some species; feet with thick, long-clawed toes
- Sexes similar

**Habitat** Guineafowl habitat ranges from dense tropical rainforests to arid grasslands.

**Food** Guineafowls feed on seeds, nuts, leaves, buds, and fruit, as well as a variety of invertebrates. They forage mostly on the ground, where they use their feet and bills to dig into the soil in search of roots, bulbs, and insects. Guineafowls also associate with other animals, such as large mammals, while foraging.

**Breeding** All guineafowl species appear to be monogamous. Their nests, as in many galliforms, are simple, usually consisting of scrapes or shallow depressions in the ground that may or may not be lined with leaves or feathers. Nests are often placed near the base of a tree or with some cover from grass. Females lay 4 to 19 eggs and incubate them the majority of the time. Incubation takes 23 to 28 days, and males are often nearby, guarding the female on the nest. Both males and females care for the chicks, which are able to leave the nest shortly after hatching. Adults lead chicks during foraging and defend them from predators. Both sexes also brood the chicks.

**Conservation** Most guineafowl species are abundant, but the White-breasted Guineafowl *Agelastes meleagrides* of coastal West Africa is becoming one of Africa's most threatened non-



Vulturine Guineafowl, *Acryllium vulturinum*. Samburu National Reserve, Kenya. © Kevin Schafer.



Guineafowl are familiar to many people worldwide as noisy additions to farms and large properties, with a fondness for eating ticks. However, they are less known in their native habitats in Africa. Two savanna species are seen quite often on safari, but the rest are birds of forests and woodlands about which very little is known. Most species have distinctive dark feathers with intensely contrasting blue-white spots or stripes. They usually have bare skin on the head and in some species a plume or crest. Sexually monomorphic, they appear to be monogamous, more like Odontophoridae in their sociality than their many polygynous relatives in Phasianidae.



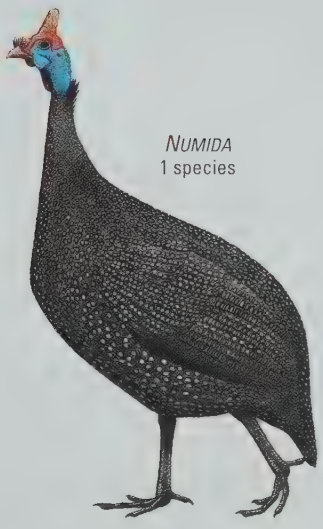
Vulturine Guineafowl, *Acryllium vulturinum*. Sagala Lodge, Taita-Taveta County, Kenya. © Nick Athanas.

passerines as a result of hunting pressure and rapid habitat destruction (1 VU). It is the only numidid species (12%) facing some level of conservation risk.

**Relationships** The placement of the guineafowls within Galliformes has only recently been clarified. Previously, these birds were most often grouped into a more inclusive Phasianidae (Cracraft 1981, Livezey & Zusi 2007). However, recent molecular phylogenetic studies consistently place Numididae outside Phasianidae as sister to a clade including Odontophoridae and Phasianidae (Dimcheff *et al.* 2002, Dyke *et al.* 2003, Crowe *et al.* 2006, Hackett *et al.* 2008, Kimball & Braun 2008, Bonilla *et al.* 2010, Kimball *et al.* 2011, Wang *et al.* 2013).



Helmeted Guineafowl, *Numida meleagris*. Waza NP, Cameroon. © Christian Artuso.



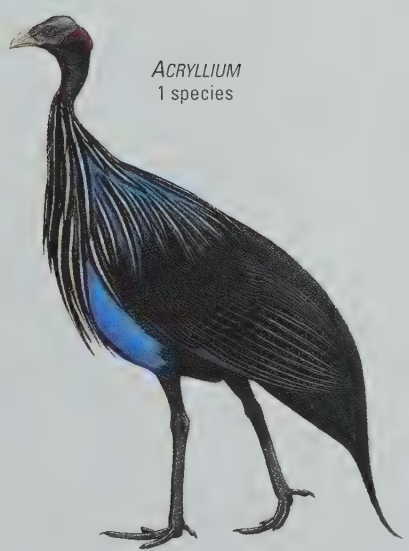
*NUMIDA*
1 species

*N. meleagris*
Helmeted Guineafowl

*AGELASTES*
2 species



*A. meleagrides*
White-breasted Guineafowl



*ACRYLLIUM*
1 species

*A. vulturinum*
Vulturine Guineafowl

*GUTTERA*
4 species



*G. pucherani*
Eastern Crested Guineafowl

# ODONTOPHORIDAE
## New World Quails

10 genera • 35 species

**Related Families** Phasianidae (pheasants and allies), Numididae (guineafowls), Cracidae (guans)

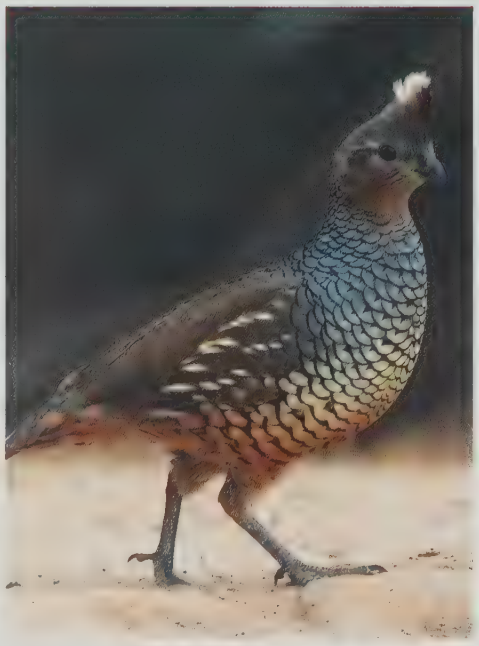
**Similar Birds** Old World quails (Phasianidae), quail-doves (Columbidae)

**Description**
- Plumage mostly earth-toned with accents in black, white, or rich brown
- Wings short and rounded; tail short to medium
- Body plump ovoid, small to mid-sized
- Bill short and stout with sharp tip and usually slightly serrated
- Head with crest in many species; neck short
- Legs short with substantial toes and elevated hallux
- Males more brightly colored and boldly patterned than females

**Habitat** New World quails live in a wide variety of habitats, including northern hardwood forests, grassland, savanna, tropical rainforests, and arid scrublands. Most of the Neotropical species occupy forested habitats exclusively.

**Food** The New World quails eat a large variety of foods, ranging from seeds, leaves, tubers, and fruits to insects. In northern species and those adapted to more arid environments, insects are only a small portion of the diet; however, they are important for all these species during breeding and the first few weeks of a chick's life.

**Breeding** The New World quails are monogamous with biparental care. The nests of many New World quail species consist of simple depressions in the ground lined with grasses, leaves, and other vegetation. Other species, such as the Montezuma Quail *Cyrtonyx montezumae* and some *Odontophorus* wood-quails, construct a domed nest with a side entrance, on the ground, made of leaves and other vegetation. Depending on the region, New World quails lay anywhere from 3 to 20 eggs; birds in more northerly habitats lay larger clutches. In some species females incubate most of the time; in others, both males and females incubate. Both the male and female assist in nest construction, especially in species that build a domed nest, and both parents brood their chicks. Incubation takes 16 to 30 days and the precocial chicks leave the nest shortly after hatching. Each parent leads them along, showing them food and



Scaled Quail, *Callipepla squamata*.
Southern Texas, USA. © Mark A. Chappell.



The throaty, whistled calls of New World quails are often our only clues to the presence of these energetic ground birds in woodland undergrowth across the Americas. With plumages in earth-tones, accented in patterns of black and white and, in some species, a jaunty top-knot on the males, these species are always a pleasure to track down and observe. They are usually seen in groups; males and females remain with the offspring once they've become independent, forming large coveys in the fall. Recent molecular work has uncovered the fact that two species of fowl from Africa are actually much closer to these New World birds than to any other in Africa, and they are now included in this family.



Chestnut Wood-quail, *Odontophorus hyperythrus*. Las Tangaras Bird Reserve, Antioquia, Colombia. © Francesco Veronesi.

acting as sentinels. The chicks can fly as soon as two weeks after hatching.

**Conservation** Although many New World quail species are common in their respective ranges, 13 (37%) face some level of conservation concern (6 NT, 5 VU, 2 EN). Two species in particular, the endangered Gorgeted Wood-quail *Ondontophorus strophium* of Colombia and the vulnerable Bearded Tree-quail *Dendrortyx barbatus* of Mexico, inhabit very limited ranges of mountain forests in the Neotropics and are thus particularly sensitive to habitat alteration. Nahan's Partridge *Ptilopachus nahani* is endangered as a result of hunting and habitat destruction in its central African rainforest range.

**Relationships** The taxonomic placement of the New World quails has been difficult to establish. Based on morphological characters, the New World quail were thought to belong within Phasianidae (Cracraft 1981, Dyke *et al.* 2003). In contrast, recent molecular phylogenetic studies consistently suggest that the New World quail are sister to all of the fowl now placed in Phasianidae (Dimcheff *et al.* 2002, Crowe *et al.* 2006, Cox *et al.* 2007, Hackett *et al.* 2008, Kimball & Braun 2008, Bonilla *et al.* 2010, Cohen *et al.* 2012, Kimball *et al.* 2011, Wang *et al.* 2013). Recent genetic work by Cohen *et al.* (2012) has found that two Old World fowl species, both in the genus *Ptilopachus,* are sister to the New World quails. We use the taxonomic arrangement suggested by Cohen *et al.* (2012), placing these two Old World partridges within Odontophoridae.



California Quail, *Callipepla californica.* Motte Rimrock Reserve, California, USA. © Mark A. Chappell.

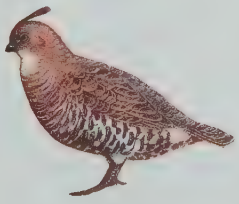
Subfamily **PTILOPACHINAE**

*PTILOPACHUS*
2 species



*P. petrosus*
Stone Partridge

*PHILORTYX*
1 species



*P. fasciatus*
Banded Quail

*DENDRORTYX*
3 species



*D. macroura*
Long-tailed Wood-partridge

*ODONTOPHORUS*
15 species



*O. erythrops*
Rufous-fronted Wood-quail

Subfamily **ODONTOPHORINAE**

*OREORTYX*
1 species



*O. pictus*
Mountain Quail

*RHYNCHORTYX*
1 species



*R. cinctus*
Tawny-faced Quail

*COLINUS*
4 species



*C. virginianus*
Northern Bobwhite

*DACTYLORTYX*
1 species



*D. thoracicus*
Singing Quail

*CALLIPEPLA*
4 species



*C. californica*
California Quail

*CYRTONYX*
3 species



*C. montezumae*
Montezuma Quail

Galliformes

# PHASIANIDAE
## Pheasants and Allies

51 genera - 187 species

**Related Families** Numididae (guineafowls), Odontophoridae (New World quails)

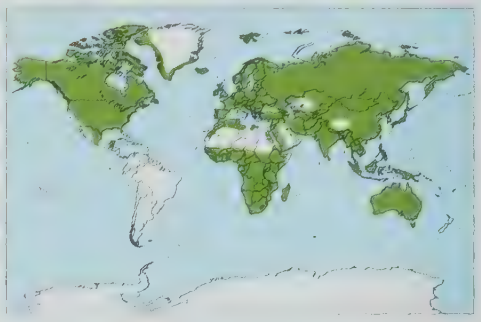
**Similar Birds** Chachalacas and guans (Cracidae), megapodes (Megapodiidae), New World quails (Odontophoridae)

**Description**
- Plumage varies by species from brightly colored to highly cryptic
- Wings medium length and rounded; tail short to long, varying in ornamentation
- Body ovoid, very small to medium-large
- Bill short and often deeper than broad; some with feathered nostrils
- Head with patches of bare, brightly colored skin and/or wattles in some species; neck with inflatable sac in some species, such as grouse
- Legs robust and sometimes spurred; feathered tarsi and fringed toes on some species, such as grouse; feet with raised hallux
- Males typically larger, more brightly colored and boldly patterned than females



Sand Partridge, *Ammoperdix heyi*.
Eilat Mountains, HaDarom, Israel. © Christopher L. Wood.





**Habitat** Phasianids live in pretty much all terrestrial habitats, from Arctic and alpine tundra to grasslands and deserts to humid tropical rainforest.

**Food** Most phasianids are omnivorous, eating a wide variety of foods, including leaves, seeds, berries, insects and other invertebrates, and small vertebrates. Some such as grouse, however, are almost entirely herbivorous, taking insects only during the first few weeks of life.

**Breeding** The various species within Phasianidae exhibit a wide diversity of breeding strategies. Many species are polygynous, with grouse famous for their lek displays involving many male contestants, peacocks and turkeys displaying in smaller groups, and some like the Great Argus *Argusianus argus* displaying solo to attract as many mates as possible. Other species, such as the Common Pheasant *Phasianus colchicus*, defend a territory with resources of value to females, and still other species are monogamous. The exaggerated plumages and displays of some phasianid males are meant to impress females, and they serve as excellent examples of sexual selection. Phasianids nest on the ground, usually in a shallow depression that is sometimes lined with dry leaves, generally concealed either under a bush or beside a rock. The number of eggs laid by a female varies widely among species, ranging from 4 to more than 20. The precocial chicks hatch after 14 to 30 days of incubation (longer in larger species). They leave the nest very shortly after hatching and remain with their parents (or just the female) to learn foraging techniques and receive protection. The female provides all the care in polygynous species. In monogamous species, the female incubates, but the male often helps tend the chicks.

Through the humble chicken, humans have developed a close relationship with this group of birds. Yet what splendid relatives barnyard chickens can boast—an array of species that strut their feathered finery often in elaborate mating rituals. Their brilliant plumages and feathered ruffs bring nothing short of royalty to mind. The Indian peacock's beguiling feather eye-spots and its dazzling display have made it one of the most recognizable birds worldwide. In addition to showy plumage, the males of many species sport spectacular wattles, patterned air-sacs, and crests. All of these adaptations have undergone intense sexual selection, and the female in most species chooses and mates with a male, then takes on all parental duties without his assistance.



Lesser Prairie-chicken, *Tympanuchus pallidicinctus*. Milnesand, New Mexico, USA. © Drew Fulton.

**Conservation** Many phasianid species are challenged by habitat destruction and hunting, with 68 species (36%) facing some level of conservation risk (31 NT, 25 VU, 9 EN, 3 CR). Although the critically endangered Himalayan Quail *Ophrysia superciliosa* has not been recorded with certainty since 1876, populations may still exist because the species is extremely difficult to detect. The critically endangered Djibouti Francolin *Francolinus ochropectus* has an extremely small and fragmented range, within which the population appears to be declining dramatically.

**Relationships** Phasianids appear to be sister to the New World quails, and these two families are in turn sister to the guineafowls (Dimcheff *et al.* 2002, Crowe *et al.* 2006, Cox *et al.* 2007, Hackett *et al.* 2008, Kimball & Braun 2008, Bonilla *et al.* 2010, Kimball *et al.* 2011, Wang *et al.* 2013). Recent molecular phylogenetic studies support the inclusion in Phasianidae of both the grouse and the turkeys, which were previously often placed in their own families (Sibley & Ahlquist 1990, Shibusawa *et al.* 2004, Kriegs *et al.* 2007, Eo *et al.* 2009). The placement of genera within Phasianidae here generally follows the arrangement in del Hoyo and Collar (2014) with adjustments from Kimball *et al.* (2011) for the placement of *Perdix* and *Pucrasia* and for the paraphyletic nature of Pavonini.



Palawan Peacock-pheasant, *Polyplectron napoleonis*. Palawan, Philippines. © Rob Hutchinson / Birdtour Asia.

## Subfamily **Rollulinae**

*Xenoperdix*
1 species



*X. udzungwensis*
Udzungwa Forest-partridge

*Rollulus*
1 species



*R. rouloul*
Crested Partridge

*Arborophila*
22 species



*A. torqueola*
Hill Partridge

*Rhizothera*
2 species



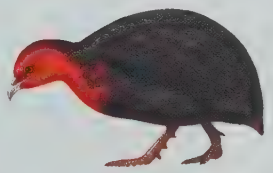
*R. longirostris*
Long-billed Partridge

*Melanoperdix*
1 species



*M. niger*
Black Partridge

*Haematortyx*
1 species



*H. sanguiniceps*
Crimson-headed Partridge

*Caloperdix*
1 species



*C. oculeus*
Ferruginous Partridge

*Galloperdix*
3 species



*G. lunulata*
Painted Spurfowl

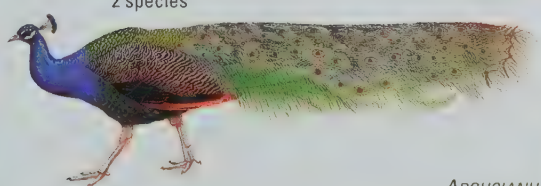
## Subfamily **Phasianinae**
## Tribe **Pavonini**

*Afropavo*
1 species



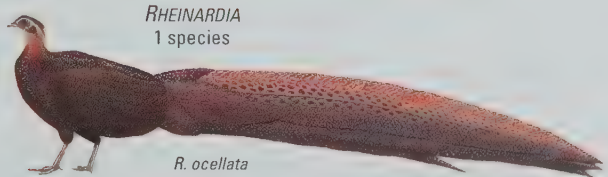
*A. congensis*
Congo Peafowl

*Pavo*
2 species



*P. cristatus*
Indian Peafowl

*Rheinardia*
1 species



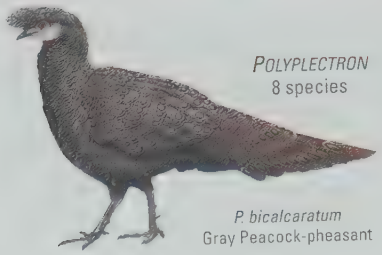
*R. ocellata*
Crested Argus

*Argusianus*
1 species



*A. argus*
Great Argus

## Tribe **Polyplectronini**



*POLYPLECTRON*
8 species

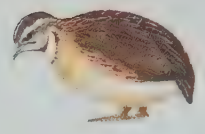
*P. bicalcaratum*
Gray Peacock-pheasant

## Tribe **Coturnicini**



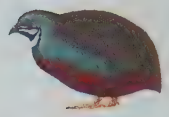
*MARGAROPERDIX*
1 species

*M. madagarensis*
Madagascar Partridge



*COTURNIX*
5 species

*C. coturnix*
Common Quail



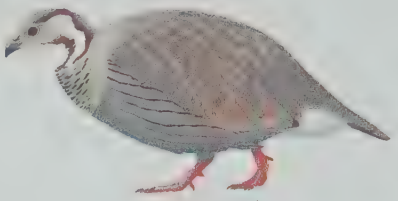
*SYNOICUS*
3 species

*S. chinensis*
Asian Blue Quail



*ANUROPHASIS*
1 species

*A. monorthonyx*
Snow Mountain Quail



*TETRAOGALLUS*
5 species

*T. himalayensis*
Himalayan Snowcock



*ALECTORIS*
7 species

*A. rufa*
Red-legged Partridge



*LERWA*
1 species

*L. lerwa*
Snow Partridge



*AMMOPERDIX*
2 species

*A. griseogularis*
See-see Partridge



*PERDICULA*
4 species

*P. asiatica*
Jungle Bush-quail



*OPHRYSIA*
1 species

*O. superciliosa*
Himalayan Quail



*PTERNISTIS*
24 species

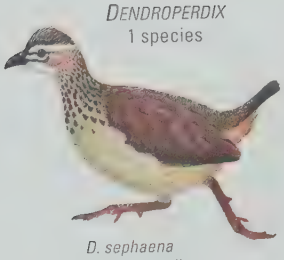
*P. leucoscepus*
Yellow-necked Francolin



*FRANCOLINUS*
5 species

*F. francolinus*
Black Francolin

## Tribe **Gallini**



*DENDROPERDIX*
1 species

*D. sephaena*
Crested Francolin



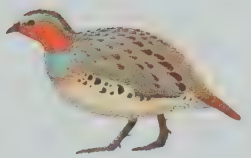
*PELIPERDIX*
4 species

*P. coqui*
Coqui Francolin



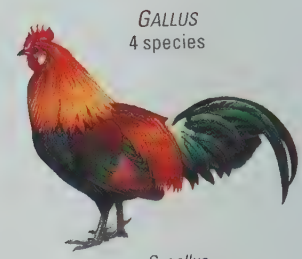
*SCLEROPTILA*
9 species

*S. levaillantii*
Red-winged Francolin



*BAMBUSICOLA*
3 species

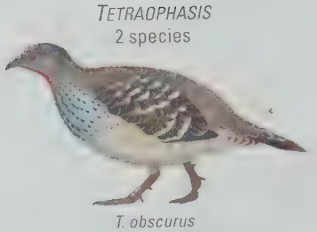
*B. thoracicus*
Chinese Bamboo-partridge



*GALLUS*
4 species

*G. gallus*
Red Junglefowl

## Tribe **Lophophorini**



*TETRAOPHASIS*
2 species

*T. obscurus*
Chestnut-throated Partridge



*LOPHOPHORUS*
3 species

*L. impejanus*
Himalayan Monal



*TRAGOPAN*
5 species

*T. temminckii*
Temminck's Tragopan



*ITHAGINIS*
1 species

*I. cruentus*
Blood Pheasant

## Tribe **Phasianini**

*Pucrasia*
1 species

*P. macrolopha*
Koklass Pheasant

*Perdix*
3 species

*P. perdix*
Gray Partridge

*Syrmaticus*
5 species

*S. humiae*
Mrs Hume's Pheasant

*Chrysolophus*
2 species

*C. pictus*
Golden Pheasant

*Phasianus*
2 species

*P. colchicus*
Common Pheasant

*Crossoptilon*
4 species

*C. auritum*
Blue Eared-pheasant

*Catreus*
1 species

*C. wallichii*
Cheer Pheasant

*Lophura*
11 species

*L. ignita*
Bornean Crested Fireback

## Tribe **Tetraonini**

*Meleagris*
2 species

*M. gallopavo*
Wild Turkey

*Bonasa*
3 species

*B. bonasia*
Hazel Grouse

*Lagopus*
3 species

*L. lagopus*
Willow Grouse

*Tetrao*
2 species

*T. urogallus*
Western Capercaillie

*Dendragapus*
2 species

*D. fuliginosus*
Sooty Grouse

*Falcipennis*
3 species

*F. canadensis*
Spruce Grouse

*Lyrurus*
2 species

*L. tetrix*
Black Grouse

*Centrocercus*
2 species

*C. urophasianus*
Sage Grouse

*Tympanuchus*
3 species

*T. cupido*
Greater Prairie-chicken

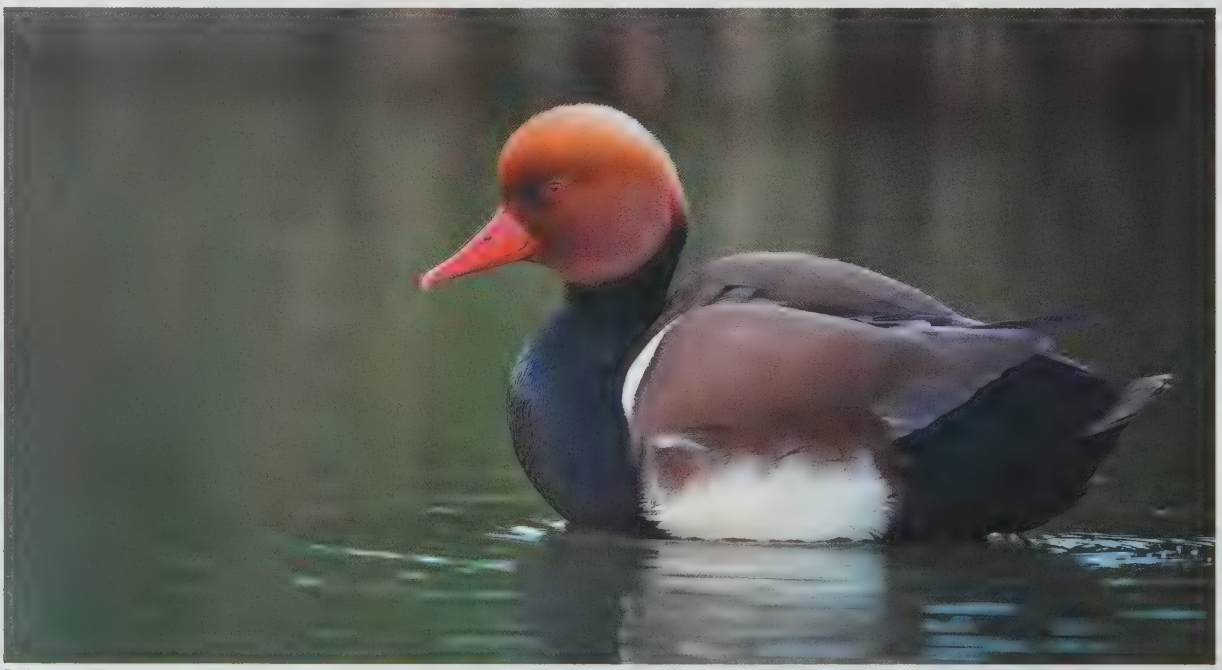
# Order: ANSERIFORMES

## Families: Anhimidae, Anseranatidae, Anatidae

Anseriformes, often collectively referred to as waterfowl, includes three families that have always been allied on the basis of many shared morphological characters (Cracraft 1981, Frith & Davies 1961, Livezey & Zusi 2001, Livezey & Zusi 2007). They are the screamers (Anhimidae), the Magpie Goose (Anseranatidae), and the ducks, geese, and swans (Anatidae). The relative arrangements of these families within Anseriformes have been subject to debate, with the Magpie Goose alternately being allied with screamers (Eo *et al.* 2009) or with anatids (Frith & Davies 1961, Corbett & Hertog 1996, Ericson *et al.* 2006a, Hackett *et al.* 2008). In addition to the uncertain placement of the Magpie Goose, whistling-ducks (*Dendrocygna*), which have recently been treated as part of Anatidae (Donne-Goussé *et al.* 2002, Eo *et al.* 2009, Gonzalez *et al.* 2009), could be sister to all other Anatidae and are sometimes placed in their own family.



Lesser Whistling-duck, *Dendrocygna javanica*. Singapore Botanic Gardens, Singapore. © Con Foley.



Red-crested Pochard, *Netta rufina*. Pont de Gau Ornithological Park, Camargue, France. © Ian Davies.

Anseriformes

# ANHIMIDAE
## Screamers

2 genera • 3 species

**Related Families** Anatidae (waterfowl), Anseranatidae (Magpie Goose)

**Similar Birds** Cranes (Gruidae), storks (Ciconiidae), bustards (Otididae)

**Description**
- Plumage generally black, brown, or gray, lighter below, with some brighter white markings on the head, neck, and/or wings; no apteria in plumage
- Wings deep and broad, with two sharp spikes that protrude from the bend of each (on manus); tail short
- Body medium-large and stocky fusiform; no uncinate processes on ribs
- Bill short, chicken-like
- Head small, with crest or frontal spike; head and neck with short, downy feathers; neck long
- Legs medium to medium-long and heavy; heavy feet with long toes webbed only at the very base
- Females slightly smaller than males, sexes otherwise similar

**Habitat** Screamers inhabit a diversity of lowland tropical and subtropical wetlands: marshes, wet savannas, riparian corridors, and other larger bodies of water.

**Food** Almost entirely herbivorous, screamers forage mostly by grazing on leaves, flowers, seeds, and other aquatic vegetation. They occasionally dig in the mud for food as well, although it is not yet clear what they seek.



Southern Screamer, *Chauna torquata*.
Caiman Lodge, Mato Grosso de Sul, Brazil. © Nick Athanas.





**Breeding** Screamers are monogamous with biparental care, and they appear to mate for life. Their nests consist of large mats of vegetation, floating among emergent plants or on dry land close to water. Females lay 2 to 7 eggs. Both sexes are active in constructing the nest, incubating the eggs, and raising the chicks. The chicks hatch after being incubated for 42 to 45 days, and the adults feed them when they

Like some strange, composite mythological creature, screamers have a disproportionately small chicken-like head, the bulky body of a goose, and sharp spurs on the wrists of their wings—used frequently in battles over mates and territory. These residents of South American backwaters feed, like geese, almost exclusively on vegetation. Screamers are noted for their very long and robust toes, webbed only at their bases, a dermal layer of air-filled sacs that gives the flesh a spongy texture, and ribs lacking the uncinate processes seen in all other birds. Their massive, broad wings suit them well for soaring once aloft. Seldom do they actually "scream," instead making hoarse, haunting, otherworldly sounds that recall geese and cranes.



Southern Screamer, *Chauna torquata*. Near Rio Claro, Matto Grasso, Brazil. © D. W. Winkler.



Horned Screamer, *Anhima cornuta*. Cocha Blanco, Manu NP, Peru. © Nick Athanas.

are very young. The young are independent by about 12 to 14 weeks post-hatch.

Conservation Only one screamer species (33%) faces immediate conservation concerns (1 NT): the small population of the Northern Screamer *Chauna chavaria*, confined to northern Colombia and northwest Venezuela, is thought to be declining.

Relationships Strong molecular and morphological evidence (Livezey & Zusi 2001) places the screamers within the Anseriformes, but it is unclear whether Anhimidae is sister to the remaining two families in this order, or alternatively, sister to Anseranatidae (Eo *et al.* 2009, Donne-Goussé *et al.* 2002, Ericson *et al.* 2006a, Hackett *et al.* 2008).



Southern Screamer, *Chauna torquata*. Iberá Wetlands, Corrientes, Argentina. © Santiago Imberti.

*ANHIMA*
1 species



*A. cornuta*
Horned Screamer

*CHAUNA*
2 species



*C. chavaria*
Northern Screamer

Anseriformes

# ANSERANATIDAE

Magpie Goose

1 genus • 1 species

**Related Families** Anhimidae (screamers), Anatidae (waterfowl)

**Similar Birds** Geese (Anatidae)

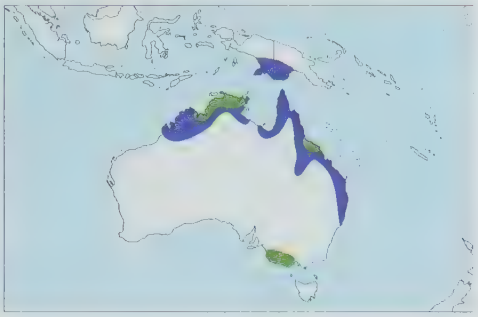
**Description**

- Plumage glossy black on head, neck, and wings; extensive white on belly, back, and rump
- Wings broad and black with white coverts; tail medium-short
- Body medium-large, ovoid fusiform
- Bill long with a hooked nail at the end, more exaggerated than that of most anatids
- Head with variable hump on top and warty bare red facial skin; neck very long
- Legs medium-long and bright orange; feet with long, partially webbed toes
- Sexes similar



Magpie Goose, *Anseranas semipalmata*. Townsville, Queensland, Australia. © Graeme Chapman.





**Habitat** Magpie Geese live in flooded grasslands, marshes, swamps, and the floodplains of tropical rivers. Flooded forests are important roost sites, whereas areas of permanent water are important during the dry season. Nesting occurs in marshes of rush or wild rice.

**Food** Magpie Geese predominantly feed on the seeds, roots, and leaves of marsh grasses and wild rice. In the dry season, they also use their hooked bills to dig in the soil for roots and bulbs.

**Breeding** Magpie Geese often nest in large colonies. They often form polygynous mating groups, which are most frequently composed of one male and two females. It appears that Magpie Geese mate for life. Nests are a deep cup of woven vegetation on top of a platform of floating vegetation, mostly rushes. Both females of a trio lay their eggs in the same nest; resulting clutch sizes can range from 1 to 16 eggs. In nests with two females, each will generally lay fewer eggs than in nests with only one female. All parents participate in nestbuilding, incubation, and caring for the chicks. Chicks are precocial, hatching after 23 to 30 days of incubation and leaving the nest only one day after hatching, but they are fed by their parents when they are very young and remain with the adults until the following year.

**Conservation** Although the Magpie Goose currently faces minimal conservation risk, its population has declined substantially; the species has been extirpated from much of eastern and southern Australia by habitat destruction and hunting.

**Relationships** Anseranatidae, with only one species, shows clear affinities with the other two anseriform families (Donne-Goussé *et al.* 2002, Dickinson 2003, Gill *et al.* 2009, Christidis & Boles 2008, Eo *et al.* 2009). However, the relative position of these families is not fully resolved, as all three possible arrangements receive support in different studies (Frith & Davies 1961, Corbett *et al.* 1996, Donne-Goussé *et al.* 2002, Eo *et al.* 2009, Livezey & Zusi 2001, Livezey & Zusi 2007).

The northeast coast of Australia and southern coast of New Guinea are home to meandering rivers that feed extensive tropical marshes. In these wetlands, the most apparent nesting bird is the Magpie Goose, an imposing black-and-white bird that forages in the marshes and raises its young in colonies of many hundreds of nests, each nest very often attended by a trio of two females and a male. With a high forehead and a knob atop the head, bare red facial skin, and longish legs with partially webbed feet, these "geese" are distinctive, indeed. Magpie Geese are long-lived anseriforms, having lifespans of 30 or more years that begin with more intensive and long-lasting parental care than received by others in this order.



Magpie Goose, *Anseranas semipalmata*. Ayr, Queensland, Australia. © Graeme Chapman.

*ANSERANAS*
1 species



*A. semipalmata*
Magpie Goose

Anseriformes

# ANATIDAE
Waterfowl

52 genera • 165 species

Related Families Anhimidae (screamers), Anseranatidae (Magpie Goose)

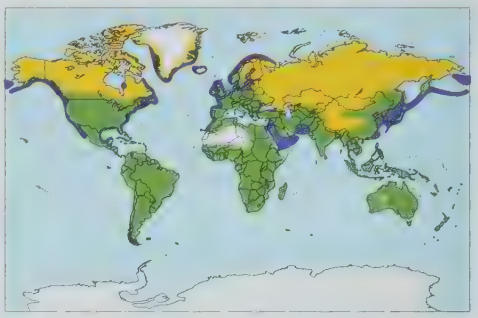
Similar Birds Magpie Goose (Anseranatidae), grebes (Podicipedidae), loons (Gaviidae)

Description
- Plumage varies widely in colors and patterns; many with browns, whites, and grays; many others with bright patches of iridescent plumage; many ducks with very dense plumage that increases buoyancy
- Wings pointed; tail short
- Body small to large, fusiform to ovoid
- Bill lamellate, broad, flat, and rounded at the tip in most species
- Head generally small; neck long in ducks, very long in geese and swans
- Legs short to medium; feet webbed, toes large but claws short
- Males typically more brightly colored than females



Ruddy-headed Goose, *Chloephaga rubidiceps*.
Punta Arenas, Magallanes, Patagonia, Chile. © D. W. Winkler.





Familiar as cartoon characters and stars of TV commercials, hunted and domesticated for centuries, waterfowl yet remain emblems of the wild. From shallow coastal bays to some of the highest and fastest alpine streams, waterfowl occupy all aquatic habitats of Earth except the remote pelagic zone of the oceans. The familiar waterfowl of the Northern Hemisphere are a small subset of a more ancient diversity still visible in the Southern Hemisphere, where there are black swans, geese that never swim, and ducks with a bizarre assortment of bills and appendages. Lastly, it turns out that ducks have riveting sex lives, with some males having penises as long as their bodies and females possessing twisted oviducts to match.

Habitat Anatids have the broadest habitat preferences of any aquatic birds: open ocean, bays, lagoons, lakes and ponds, freshwater marshes, and rivers of all sizes. Most species rely on water, although some can forage extensively away from it. They are absent from the deep ocean, although many species frequent the relatively shallow waters above continental shelves during the non-breeding season.

Food Most geese, swans, and "dabbling ducks" (ducks of shallower waters in the genus *Anas*) are herbivorous. Many geese and some ducks graze to feed; swans and other ducks feed on the surface of the water or pull vegetation from beneath them. Many of the dabbling ducks filter feed using lamellae on their bills. During the breeding season, many dabbling ducks also consume large quantities of insects and aquatic invertebrates. "Diving ducks," on the other hand, are mostly carnivorous. Scoters, eiders, and mergansers feed on fish as well as mollusks and other aquatic invertebrates. *Aythya* ducks also dive for plant material.

Breeding Most anatids are monogamous. In geese and swans, pair bonds may last for life. Breeding aggregations among waterfowl can vary from highly territorial pair groups to dense breeding colonies. Intraspecific brood parasitism occurs in some species, and some species lay their eggs in their own nests as well as those of other species, but only in the Black-headed Duck *Heteronetta atricapilla* has obligate brood parasitism evolved. Most species nest on the ground—usually near the edge of the water—



American Wigeon, *Mareca americana*. Sweetwater Wetlands, Arizona, USA. © Christopher L. Wood.

and line the nest with down, especially at high latitudes. But some species nest in tree holes or burrows or even arboreal stick nests created by other species. Waterfowl lay 4 to 13 relatively large eggs, which hatch after 21 to 40 days of incubation. In most ducks, only the female incubates the eggs and cares for the chicks. However, in the larger and highly territorial anatids, males will sit on the eggs when the females are away, even though they do not possess a brood patch for functional incubation. Chicks are highly precocial; soon after hatching, they leave the nest, imprinting on the nearest animate being (usually their mother), who will attend them until they reach independence, weeks to months later.

**Conservation** Although some waterfowl species are among the most numerous birds in the world, populations of 40 species (24%) are declining from habitat destruction, hunting, and, in the case of island endemics, the introduction of non-native mammalian predators (9 NT, 14 VU, 11 EN, 6 CR). Some species have recently gone extinct, including the distinctive Labrador Duck *Camptorhynchus labradorius* in 1875 and the Auckland Merganser *Mergus australis* by 1910. The six critically endangered species are spread throughout the family and the globe.

**Relationships** Anatidae is likely sister to Anseranatidae, which in turn is sister to Anhimidae (Hackett *et al.* 2008). The *Dendrocygna* whistling-ducks are either embedded within Anatidae (Eo *et al.* 2009) or sister to it (Donne-Goussé *et al.* 2002, Gonzalez *et al.* 2009). The super-tree analysis by Eo *et al.* (2009) served to reinforce how elusive consensus is regarding relationships within the Anatidae. The arrangement of genera here follows that used by del Hoyo and Collar (2014), but it must remain clear that many of these groups are likely paraphyletic and their boundaries in need of further definition.



Black-necked Swan, *Cygnus melancoryphus*. Puerto Montt, Chile. © Ramón Casares.

## Subfamily **DENDROCYGNINAE**

*DENDROCYGNA*
8 species



*D. bicolor*
Fulvous Whistling-duck

*THALASSORNIS*
1 species



*T. leuconotus*
White-backed Duck

## Subfamily **OXYURINAE**

*HETERONETTA*
1 species



*H. atricapilla*
Black-headed Duck

*NOMONYX*
1 species



*N. dominicus*
Masked Duck

*OXYURA*
6 species



*O. jamaicensis*
Ruddy Duck

*BIZIURA*
1 species



*B. lobata*
Musk Duck

## Subfamily **ANSERINAE**

### Tribe **Malacorhynchini**

*MALACORHYNCHUS*
1 species



*M. membranaceus*
Pink-eared Duck

### Tribe **Stictonettini**

*STICTONETTA*
1 species



*S. naevosa*
Freckled Duck

### Tribe **Cereopseini**

*CEREOPSIS*
1 species



*C. novaehollandiae*
Cape Barren Goose

*COSCOROBA*
1 species



*C. coscoroba*
Coscoroba Swan

### Tribe **Cygnini**

*CYGNUS*
6 species



*C. cygnus*
Whooper Swan

### Tribe **Anserini**

*BRANTA*
6 species



*B. canadensis*
Canada Goose

*ANSER*
10 species



*A. anser*
Graylag Goose

## Subfamily **ANATINAE** (1 of 2)

### Tribe **Mergini**

*CLANGULA*
1 species



*C. hyemalis*
Long-tailed Duck

*SOMATERIA*
3 species



*S. spectabilis*
King Eider

*POLYSTICTA*
1 species



*P. stelleri*
Steller's Eider

*MELANITTA*
6 species



*M. perspicillata*
Surf Scoter

*BUCEPHALA*
3 species



*B. clangula*
Common Goldeneye

*MERGELLUS*
1 species



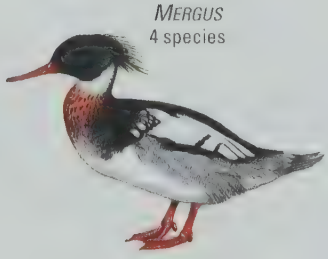
*M. albellus*
Smew

*LOPHODYTES*
1 species



*L. cucullatus*
Hooded Merganser

*MERGUS*
4 species



*M. serrator*
Red-breasted Merganser

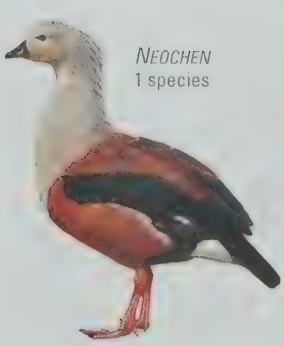
*HISTRIONICUS*
1 species



*H. histrionicus*
Harlequin Duck

### Tribe **Tadornini**

*NEOCHEN*
1 species



*N. jubata*
Orinoco Goose

*CHLOEPHAGA*
5 species



*C. poliocephala*
Ashy-headed Goose

*RADJAH*
1 species



*R. radjah*
Radjah Shelduck

*ALOPOCHEN*
1 species



*A. aegyptiaca*
Egyptian Goose

*TADORNA*
6 species



*T. tadorna*
Common Shelduck

Subfamily **Anatinae** (2 of 2)

Tribe **Cairinini**

*Plectropterus*
1 species



*P. gambensis*
Spur-winged Goose

*Cairina*
1 species



*C. moschata*
Muscovy Duck

*Sarkidiornis*
2 species



*S. melanotos*
African Comb Duck

*Nettapus*
3 species



*N. coromandelianus*
Cotton Pygmy-goose

*Callonetta*
1 species



*C. leucophrys*
Ringed Teal

*Aix*
2 species



*A. sponsa*
Wood Duck

*Chenonetta*
1 species



*C. jubata*
Maned Duck

Tribe **Hymenolaimini**

*Hymenolaimus*
1 species



*H. malacorhynchos*
Blue Duck

Tribe **Merganettini**

*Merganetta*
1 species



*M. armata*
Torrent Duck

Tribe **Aythyini**

*Pteronetta*
1 species



*P. hartlaubii*
Hartlaub's Duck

*Cyanochen*
1 species



*C. cyanoptera*
Blue-winged Goose

*Marmaronetta*
1 species



*M. angustirostris*
Marbled Teal

*Asarcornis*
1 species



*A. scutulata*
White-winged Duck

*Netta*
3 species



*N. rufina*
Red-crested Pochard

*Aythya*
12 species



*A. marila*
Greater Scaup

*Rhodonessa*
1 species



*R. caryophyllacea*
Pink-headed Duck

*Salvadorina*
1 species



*S. waigiuensis*
Salvadori's Teal

*Tachyeres*
4 species



*T. patachonicus*
Flying Steamerduck

Tribe **Anatini**

*Lophonetta*
1 species



*L. specularioides*
Crested Duck

*Speculanas*
1 species



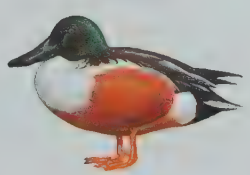
*S. specularis*
Spectacled Duck

*Amazonetta*
1 species



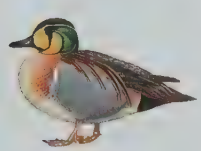
*A. brasiliensis*
Brazilian Teal

*Spatula*
10 species



*S. clypeata*
Northern Shoveler

*Sibirionetta*
1 species



*S. formosa*
Baikal Teal

*Mareca*
5 species



*M. penelope*
Eurasian Wigeon

*Anas*
29 species



*A. platyrhynchos*
Mallard

# Order: PODICIPEDIFORMES

## PODICIPEDIDAE
Grebes

6 genera · 20 species

**Related Families** Phoenicopteridae (flamingos)

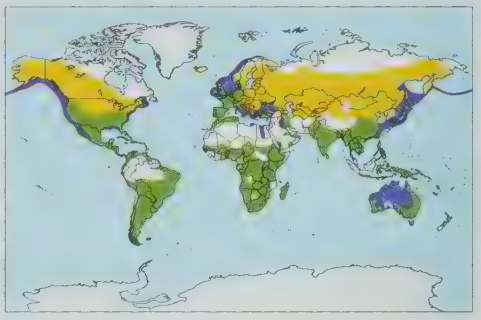
**Similar Birds** Loons (Gaviidae), coots and gallinules (Rallidae), ducks (Anatidae), finfoots (Heliornithidae)

**Description**
- Plumage most often black or brown above and white below, often with yellow tufts or patches
- Wings short and narrow; tail rudimentary without typical rectrices
- Body small to medium, cylindrical fusiform, usually held horizontal
- Bill pointed, variable in length
- Head small; neck medium to long
- Legs robust, laterally compressed, situated far back on narrowed pelvis; toes lobed with flattened claws
- Sexes similar; males larger than females



Great Crested Grebe, *Podiceps cristatus*. Ardenne, Belgium. © Ph Moës.





**Habitat** Grebes live in a wide variety of freshwater habitats, ranging from large lakes to marshes. To construct and anchor their nests, grebes require some vegetation on or near the water's edge. Many species spend the winter in marine environments, but usually not far from shore.

**Food** Grebes primarily feed on fish and aquatic invertebrates. Diet varies among species, with larger species taking mainly fish, and smaller species a higher proportion of aquatic insects and crustaceans, including brine shrimp and crayfish. Grebes mainly dive for their food, either to chase fish or pluck prey from aquatic vegetation or lakebeds. Occasionally they will take prey from the water surface or overhanging vegetation.

**Breeding** Grebes are monogamous with biparental care. Some species have elaborate courtship displays, including in a few a spectacular synchronized "dance" across the water. Most grebes nest on mats of floating vegetation that incorporate emergent vegetation as nest material and camouflage. Others nest on a mound of vegetation in shallow water built up from the bottom, and rarely an individual will build on dry land next to the water. Females normally lay 2 to 7 eggs, and both male and female are active in all aspects of parental care, from constructing the nest, through incubating the eggs, to feeding the chicks. Incubation takes 20 to 30 days and begins with the first or second egg. The brood hatches asynchronously, but as soon as the last chick hatches, the whole brood climbs onto the back of one of the parents. Both parents stay with the chicks throughout their development, most often one diving for food and the other serving as a mobile nest, ferrying the

Grebes are foot-propelled divers specialized for life on and under water: their legs are set so far back on their bodies that they are unable to walk on land, and their lobed toes fold into a blade that glides through the water on every upstroke. Grebes rocket through the water by compressing water behind them with coordinated thrusts of their muscular legs. With their eerie eyes of intense scarlet-orange, floating nests, synchronized aquatic courtship dances, and a habit of filling their stomachs with their own feathers, which they feed to their young. These birds grow more beguiling the more you study them. To their peril, flightless species of grebes have arisen multiple times in large stable lakes.

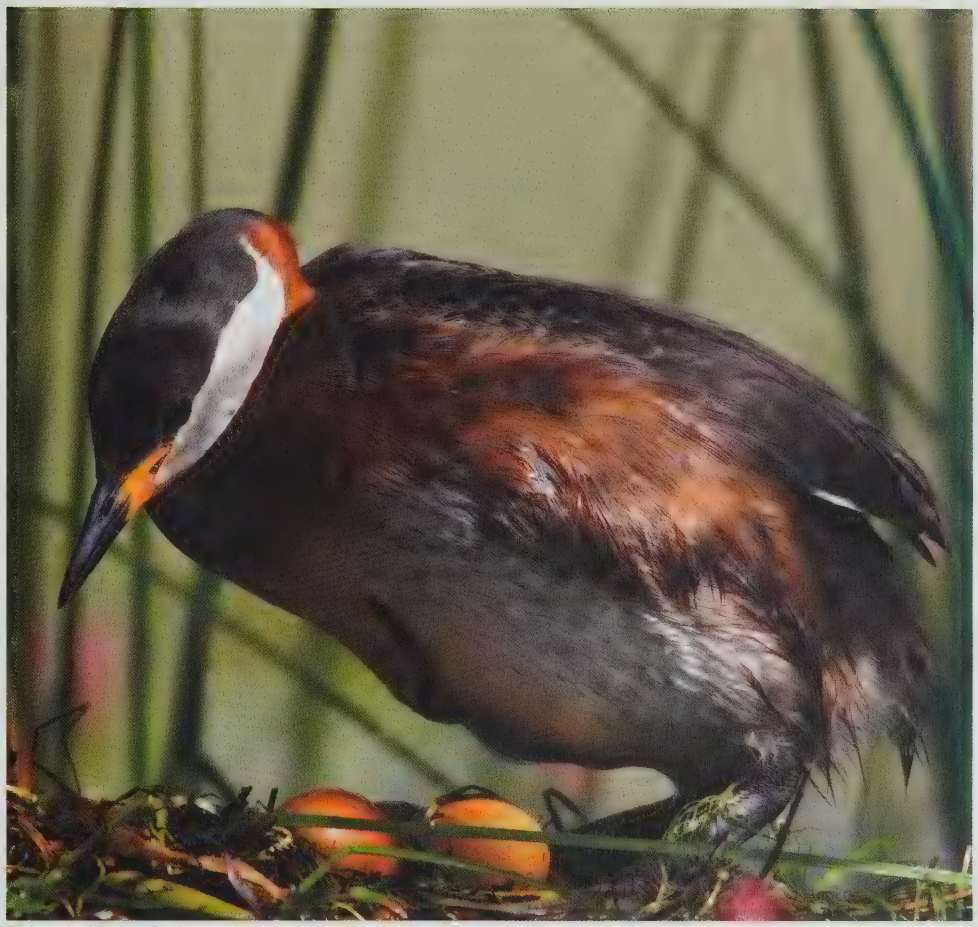


Great Crested Grebe, *Podiceps cristatus*. Herdsman Lake, Perth, Western Australia. © D. W. Winkler.

brood to sources of food. Occasionally, in some species, chicks from an earlier brood assist in nest construction and care of a second brood.

**Conservation** Currently, about one-third of grebe species (30%) face some level of conservation risk (1 NT, 2 VU, 1 EN, 2 CR). The Junin Grebe *Podiceps taczanowskii*, a flightless grebe endemic to Lake Junín in Peru, and the Hooded Grebe *P. gallardoi* of Argentina and Chile are both critically endangered. Both occupy small, restricted ranges with extremely small populations in rapid decline due to habitat alteration, pollution, introduced species, and climate change. Three species of grebes have recently gone extinct: the Atitlan Grebe *P. gigas*, the Colombian Grebe *P. andinus*, and the Alaotra Grebe *Tachybaptus rufovatus*. All three species were last documented in the 1980's and are thought to have been driven extinct by habitat alteration, the introduction of predatory fishes, and new fishing practices.

**Relationships** Traditionally, the grebes have been placed near the loons (Cracraft 1981, Livezey & Zusi 2007). However, many recent molecular and morphological studies have recovered a sister relationship between grebes and flamingos (van Tuinen *et al.* 2001, Mayr 2004, Ericson *et al.* 2006a, Hackett *et al.* 2008, Jarvis *et al.* 2014). Although disagreement still exists regarding this relationship (Storer 2006, Livezey 2010a), the preponderance of evidence favors the grebe-flamingo sister relationship. Regardless, most checklists (Dickinson & Remsen 2013, Clements *et al.* 2014, Gill & Donsker 2014) have opted to maintain each family in its own order.

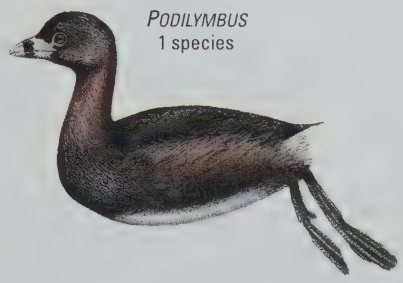


Red-necked Grebe, *Podiceps grisegena*. Walendów, Poland. © Paweł Wacławik.



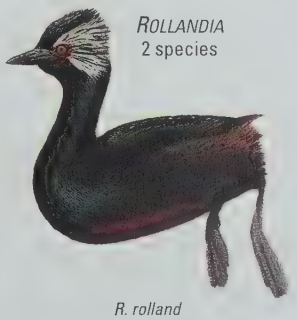
*TACHYBAPTUS*
4 species

*T. ruficollis*
Little Grebe



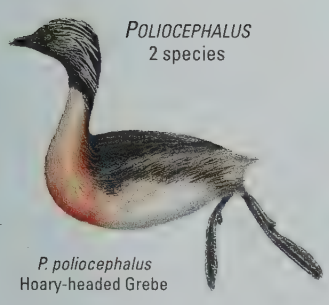
*PODILYMBUS*
1 species

*P. podiceps*
Pied-billed Grebe



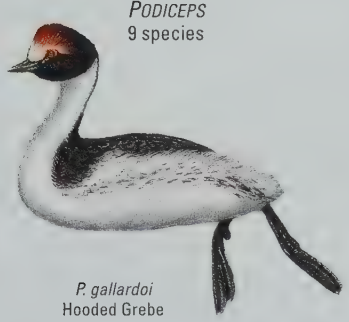
*ROLLANDIA*
2 species

*R. rolland*
White-tufted Grebe



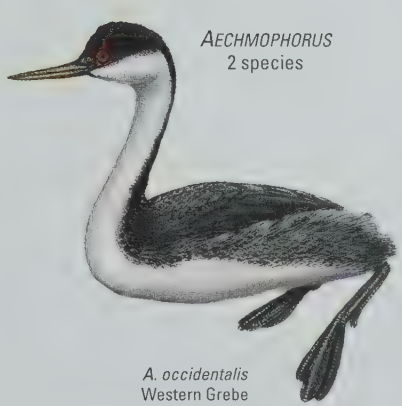
*POLIOCEPHALUS*
2 species

*P. poliocephalus*
Hoary-headed Grebe



*PODICEPS*
9 species

*P. gallardoi*
Hooded Grebe



*AECHMOPHORUS*
2 species

*A. occidentalis*
Western Grebe

# Order: PHOENICOPTERIFORMES

## PHOENICOPTERIDAE
Flamingos

3 genera • 6 species

Related Families Podicipedidae (grebes)

Similar Birds Herons (Ardeidae), spoonbills (Threskiornithidae), storks (Ciconiidae)

Description
- Plumage some combination of pink, crimson, and white; flight feathers black
- Wings short, narrow, and pointed; tail short
- Body medium-sized, fusiform
- Bill thick and sharply bent downward, with black tip; wide band of lamellae inside; tongue thick, piston-like, for pushing water through lamellae
- Head round; neck extremely long and slender
- Legs extremely long and slender; feet small with short, webbed toes
- Sexes similar

Habitat Flamingos occupy large, shallow lakes and lagoons, from the coast to high montane valleys. The waters they frequent are often extremely saline—harsh aquatic habitats that can be very productive and support a vast number of flamingos. At the same time, supporting few other vertebrates, these areas are often relatively predator-free.

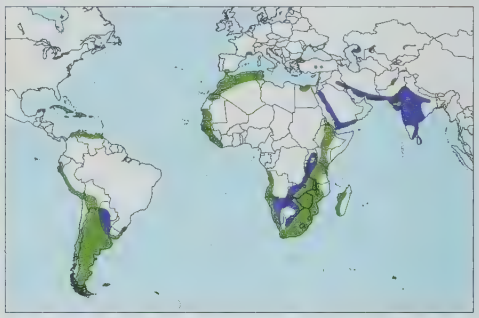
Food Flamingos feed on a variety of small aquatic invertebrates (small crustaceans, mollusks, insects, and other planktonic organisms) and plant material (usually algae). Using their large fleshy tongues as pistons, flamingos filter food out of water or mud by pushing it through the comb-like lamellae in their extraordinary bills. They also occasionally feed on larger prey by grasping it with their bill and tossing it into their mouths.

Breeding Flamingos appear to be monogamous, and they nest in enormous groups—up to one million Lesser Flamingos *Phoenicopterus minor* breed in some locations in Africa. These massive groups are conducive to large group courtship displays before pairs break off to mate and begin nesting. A flamingo nest consists of a narrow cone of mud with a shallow depression on the top, and is usually constructed on mudflats, salt flats, or other low-lying areas in the midst of salt pans. In particularly large colonies, nest densities can be as high as five nests per square meter. Females typically lay 1 egg, very rarely 2, and incubation, which takes 27 to 31 days, is shared by both parents, as are brooding and provisioning of their chick. At an age of about 5 to12 days old, chicks leave the nest to join large crèches of mobile chicks, which are attended by a few adults although each chick is fed by its own parents in the teeming mass of young birds. At first, hatchlings feed exclusively on a liquid secreted from their parents' upper digestive tracts (similar to pigeon crop milk).



Lesser Flamingo, *Phoeniconaias minor*.
Lake Abijatta, Oromia, Ethiopia. © Ian Davies.





Flamingos are perhaps best known for their long legs, sinuous neck, and pink plumage derived from the pigments in the organisms they eat. Although an iconic symbol of tropical beaches, some species inhabit lakes high in the Andes. With bills that are highly specialized for foraging on plankton, flamingos prefer lakes with the greatest concentrations of their tiny prey, often those that are so saline that no fish can survive to eat the plankton. Flamingos thus often nest on hypersaline lakes and lagoons, in dense colonies of distinctive volcano-like mud nests. One of the most beautiful spectacles in nature is the sight of dense foraging flocks taking flight over an otherwise lifeless expanse of water.



Lesser Flamingo, *Phoeniconaias minor*. Lake Nakuru NP, Kenya. © Murat Cuhadaroglu.

After four to six weeks, flamingo chicks can efficiently feed on their own, although they still may receive food from their parents until fledging at about 10 to12 weeks of age.

**Conservation** Although all species of flamingos currently exist in large populations, some species (67%) are declining rapidly (3 NT, 1 VU). The Andean Flamingo *Phoenicoparrus andinus* is considered vulnerable because of pressures arising from habitat degradation (caused by mining activities and erosion), human disturbance, and hunting pressures. The Chilean Flamingo *Phoenicopterus chilensis*, Lesser Flamingo *Phoeniconaias minor*, and Puna Flamingo *Phoenicoparrus jamesi* all suffer from habitat degradation as well, and are considered near threatened.

**Relationships** The unique morphology of Phoenicopteridae has long rendered these birds a perplexing systematic puzzle. This family has often been linked to Ciconiidae on the basis of shared morphological traits (Cracraft 1981, Livezey & Zusi 2007). Other morphological evidence suggests that Phoenicopteridae may fall within Charadriiformes, close to Recurvirostridae (Feduccia 1976). In contrast, recent molecular studies have found strong support for a sister relationship between Phoenicopteridae and Podicipedidae (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Fain & Houde 2007, Hackett *et al.* 2008), and new analyses of morphological data further support this previously unanticipated affinity (Mayr 2004, Mayr 2007). The species-level relationships within Phoenicopteridae have not yet been comprehensively studied.



Lesser Flamingo, *Phoeniconaias minor*. Lake Nakuru NP, Kenya. © Kevin Schafer.




*P. roseus*
Greater Flamingo

*P. minor*
Lesser Flamingo

*P. andinus*
Andean Flamingo

# Order: COLUMBIFORMES

## COLUMBIDAE
Doves and Pigeons

49 genera • 351 species

**Related Families** Mesitornithidae (mesites), Pteroclidae (sandgrouse)

**Similar Birds** Sandgrouse (Pteroclidae), seedsnipes (Thinocoridae)

**Description**
- Plumage soft, and variable in color, most often brown or gray, but in some species extremely colorful, with greens, yellows, pinks, and blues
- Wings typically rounded and medium-long; tail variable in length, short and truncate in some species, and long and graduated in others
- Body small to medium, ovoid
- Bill short, thin, and very slightly hooked in many, mid portion often smaller in diameter than tip, cere prominent and fleshy in many
- Head small and rounded, with a distinct crest in some species; neck thick
- Legs short; feet anisodactyl
- Sexes generally similar, though males more brightly colored and boldly patterned in some

**Habitat** Pigeons and doves occupy a wide range of habitats—mostly terrestrial—from arid desert and scrubland to dense tropical rainforest, and including the dense urban areas of the world.

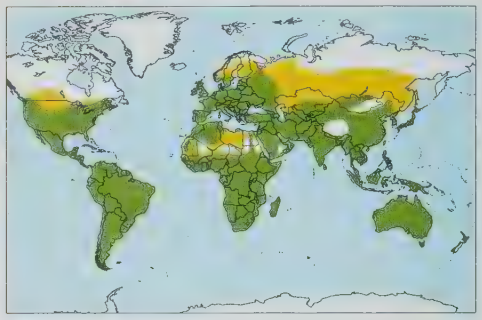
**Food** Pigeons and doves can generally be categorized as granivores, eating mostly seeds, or frugivores, eating mostly fruit. A few species eat mostly insects and others add flowers and snails to their diets.

**Breeding** Doves and pigeons are monogamous with biparental care. Some species are colonial nesters, the most famous of which is the now-extinct Passenger Pigeon *Ectopistes migratorius*, but several extant species, including wild Rock Pigeons, nest in aggregated fashion. Most dove nests consist of a loose, flimsy, and thin platforms of sticks and other vegetation, usually built on a branch or in the fork of a branch, but also on the ground. Females typically lay 1 or 2 eggs, which take 11 to 30 days to hatch (longer in larger species). In some species, the female may be the only one to build the nest, but with material brought by the male, and in other species, the male builds alone. Both sexes incubate the eggs and feed the chicks. Pigeons and doves are famous for feeding their chicks "crop milk," a secretion of epithelial cells of the crop that consists mainly of water, protein, and fat.



Gray-capped Emerald Dove, *Chalcophaps indica*. Ganeshgudi, Karnataka, India. © Varun HB.





With their small heads, characteristic head-bobbing walking gait, and deep-stroked flight, doves and pigeons are familiar worldwide. In many regions, this group is represented by a collection of earth-toned species that differ in small aspects of white spotting, etc. But, as with parrots, the columbid fauna of Australia is diverse in plumage and morphology. Almost all columbids build a flimsy platform nest of sticks, and most lay only one or two eggs. By feeding their young chicks "crop milk" from the epithelial cells of their alimentary tract, they can take advantage of a diverse diet and thus extend their breeding seasons longer than any other temperate birds in the wild.



Eared Dove, *Zenaida auriculata*. Buenos Aires, Argentina. © Ramón Casares.

**Conservation** Threatened by habitat destruction, the introduction of mammalian predators, and hunting, 118 columbid species (34%) are at risk (48 NT, 40 VU, 18 EN, 11 CR, 1 EW). A few especially notable species have become extinct in recent times. The Passenger Pigeon occurred in eastern North America, and with a population size numbering in the billions was among the most abundant birds in the world before being driven to extinction by market hunting and deforestation. The Dodo *Raphus cucullatus* occurred on the island of Mauritius; harvested by sailors and likely preyed upon by rats, cats, and pigs that came with the sailors, it went extinct by about 1680. The Rodrigues Solitaire *Pezophaps solitaria* likewise occurred on a single island in the Indian Ocean, and its path to extinction was similar to the Dodo's; both extinctions are emblematic of many columbid extinctions over the past several hundred years, and of the tenuous future for many island endemic doves. For example, the Socorro Dove *Zenaida graysoni*, endemic to a small island off the coast of Mexico, is considered extinct in the wild and exists only in captivity, where roughly 100 individuals are being bred for future release.

**Relationships** The doves and pigeons are the sole members of Columbiformes. The relationship of the doves and pigeons to other birds has long been controversial. Morphological studies have sometimes suggested that Columbiformes is sister to Pterocliformes (Livezey & Zusi 2007). Recent molecular phylogenetic studies confirm this close relationship with the sandgrouse, and generally place the doves and pigeons within an ancient group of avian orders that also includes the diverse families in Caprimulgiformes, plus Pterocliformes, Mesitornithiformes, Phoenicopteriformes, and Podicipediformes (Ericson *et al.* 2006a, Hackett *et al.* 2008), within which they may be particularly close to Mesitornithiformes and Pterocliformes (Jarvis *et al.* 2014). Within Columbidae, Columbinae is sister to the clade made up of Raphinae plus Peristerinae (Pereira *et al.* 2007), and the placement of tribes and genera within these subfamilies follows the treatment in del Hoyo and Collar (2014).

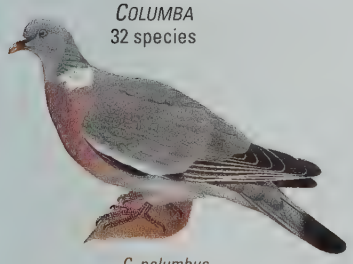


African Olive-pigeon, *Columba arquatrix*. Wondo Genet, Southern Nations, Nationalities and Peoples' Region, Ethiopia. © Ian Davies.

Subfamily **COLUMBINAE** (1 of 2)

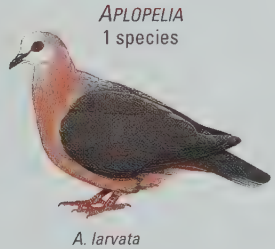
Tribe **Columbini** (1 of 2)

*COLUMBA*
32 species



*C. palumbus*
Common Woodpigeon

*APLOPELIA*
1 species



*A. larvata*
Lemon Dove

*STREPTOPELIA*
15 species



*S. turtur*
European Turtle-dove

*SPILOPELIA*
3 species



*S. senegalensis*
Laughing Dove

*NESOENAS*
2 species



*N. mayeri*
Pink Pigeon

## Subfamily **Columbinae** (2 of 2)
## Tribe **Columbini** (2 of 2)

*Macropygia*
10 species



*M. amboinensis*
Slender-billed Cuckoo-dove

*Turacoena*
2 species



*T. manadensis*
White-faced Cuckoo-dove

*Reinwardtoena*
3 species



*R. reinwardti*
Great Cuckoo-dove

*Patagioenas*
19 species



*P. cayennensis*
Pale-vented Pigeon

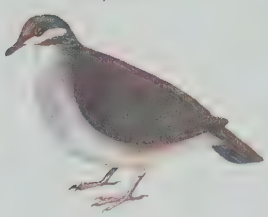
## Tribe **Zenaidini**

*Starnoenas*
1 species



*S. cyanocephala*
Blue-headed Quail-dove

*Geotrygon*
9 species



*G. chrysia*
Key West Quail-dove

*Leptotrygon*
1 species



*L. veraguensis*
Olive-backed Quail-dove

*Leptotila*
11 species



*L. verreauxi*
White-tipped Dove

*Zentrygon*
8 species



*Z. frenata*
White-throated Quail-dove

## Subfamily **Peristerinae**

*Zenaida*
7 species



*Z. auriculata*
Eared Dove

*Columbina*
9 species



*C. passerina*
Common Ground-dove

*Claravis*
3 species



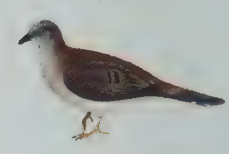
*C. pretiosa*
Blue Ground-dove

*Metriopelia*
4 species



*M. melanoptera*
Black-winged Ground-dove

*Uropelia*
1 species



*U. campestris*
Long-tailed Ground-dove

## Subfamily **Raphinae** (1 of 2)

*Henicophaps*
2 species



*H. albifrons*
New Guinea Bronzewing

*Gallicolumba*
7 species



*G. luzonica*
Luzon Bleeding-heart

*Alopecoenas*
11 species



*A. jobiensis*
White-breasted Ground-dove

*Leucosarcia*
1 species



*L. melanoleuca*
Wonga Pigeon

*Petrophassa*
2 species



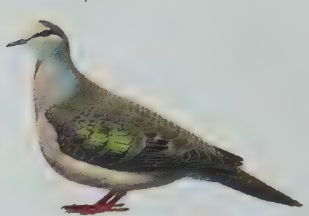
*P. rufipennis*
Chestnut-quilled Rock-pigeon

*Geophaps*
4 species



*G. plumifera*
White-bellied Spinifex Pigeon

*Phaps*
3 species



*P. chalcoptera*
Common Bronzewing

*Ocyphaps*
1 species



*O. lophotes*
Crested Pigeon

*Geopelia*
5 species



*G. striata*
Zebra Dove

*TRUGON*
1 species



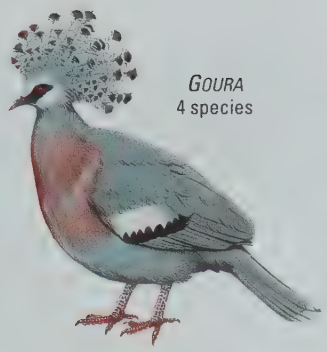
*T. terrestris*
Thick-billed Ground-pigeon

*OTIDIPHAPS*
4 species



*O. nobilis*
Green-naped Pheasant-pigeon

*GOURA*
4 species



*G. victoria*
Victoria Crowned-pigeon

*CALOENAS*
1 species



*C. nicobarica*
Nicobar Pigeon

*DIDUNCULUS*
1 species



*D. strigirostris*
Tooth-billed Pigeon

*CHALCOPHAPS*
3 species



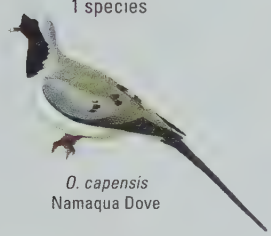
*C. indica*
Gray-capped Emerald Dove

*TURTUR*
5 species



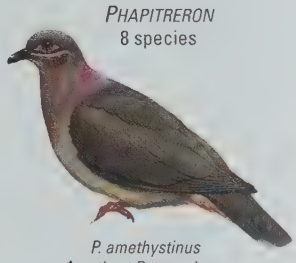
*T. afer*
Blue-spotted Wood-dove

*OENA*
1 species



*O. capensis*
Namaqua Dove

*PHAPITRERON*
8 species



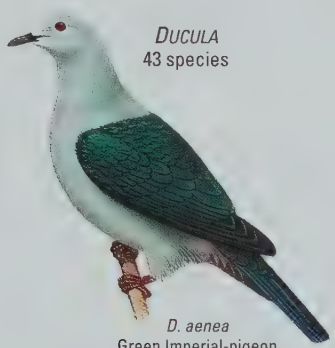
*P. amethystinus*
Amethyst Brown-dove

*TRERON*
31 species



*T. curvirostra*
Thick-billed Green-pigeon

*DUCULA*
43 species



*D. aenea*
Green Imperial-pigeon

*MEGALOPREPIA*
2 species



*M. magnifica*
Wompoo Fruit-dove

*RAMPHICULUS*
10 species



*R. jambu*
Jambu Fruit-dove

*ALECTROENAS*
3 species



*A. sganzini*
Comoro Blue-pigeon

*DREPANOPTILA*
1 species



*D. holosericea*
Cloven-feathered Dove

*CHRYSOENA*
3 species



*C. victor*
Orange Dove

*PTILINOPUS*
45 species



*P. superbus*
Eastern Superb Fruit-dove

*HEMIPHAGA*
2 species



*H. novaeseelandiae*
New Zealand Pigeon

*CRYPTOPHAPS*
1 species



*C. poecilorrhoa*
Sombre Pigeon

*GYMNOPHAPS*
4 species



*G. solomonensis*
Pale Mountain-pigeon

*LOPHOLAIMUS*
1 species



*L. antarcticus*
Topknot Pigeon

# Order: MESITORNITHIFORMES

## MESITORNITHIDAE
Mesites

2 genera • 3 species

**Related Families** Columbidae (doves and pigeons), Pteroclidae (sandgrouse)

**Similar Birds** Thrashers (Mimidae), Rail-babbler (Eupetidae), cuckoos (Cuculidae), doves (Columbidae), quail-thrushes (Cinclosomatidae)

**Description**
- Plumage generally brown, with two species dark above and pale below with dark chevrons on a white throat and breast
- Feathers lack aftershaft; oil glands absent but powderdown present
- Wings short, rounded; tail long and rounded, seldom spread
- Body small, ovoid with horizontal carriage
- Bill slender; strongly decurved and sharp-pointed in *Monias*
- Head small; neck short
- Legs short to medium; toes short and thin to long and thick
- Sexes differ only in *Monias*: male's breast markings black, female's reddish brown

**Habitat** The mesites occupy a wide variety of forests and woodlands, ranging from moist or dry forest to more open, spiny-scrub thickets, often with a dense layer of leaf litter.

**Food** Mesites feed on a wide variety of insects, fruits, and seeds, with more seeds taken during the dry season. Mesites forage mostly on the ground, using their bills to either probe under the leaf litter or lift or flick aside dead leaves in search of invertebrate prey.

**Breeding** The two *Mesitornis* mesites are presumed to be monogamous with biparental care. The Sub-desert Mesite *Monias benschi* is a cooperative breeder, with monogamous pairs or polygynandrous associations forming the core of their groups. Mesite nests are loose platforms of sticks in a low tree or shrub, with a shallow cup lined with dry leaves and sometimes decorated with lichen. Females lay 1 to 3 eggs. In one of the *Mesitornis* species only the female incubates, but both parents take care of the chicks. Both males and females incubate in *Monias*, with males taking on the majority of parental duties. When they are only a day or so old, mesite chicks drop from the nest onto the ground, where they are fed and tended by all group members until they grow independent (Seddon *et al.* 2003).



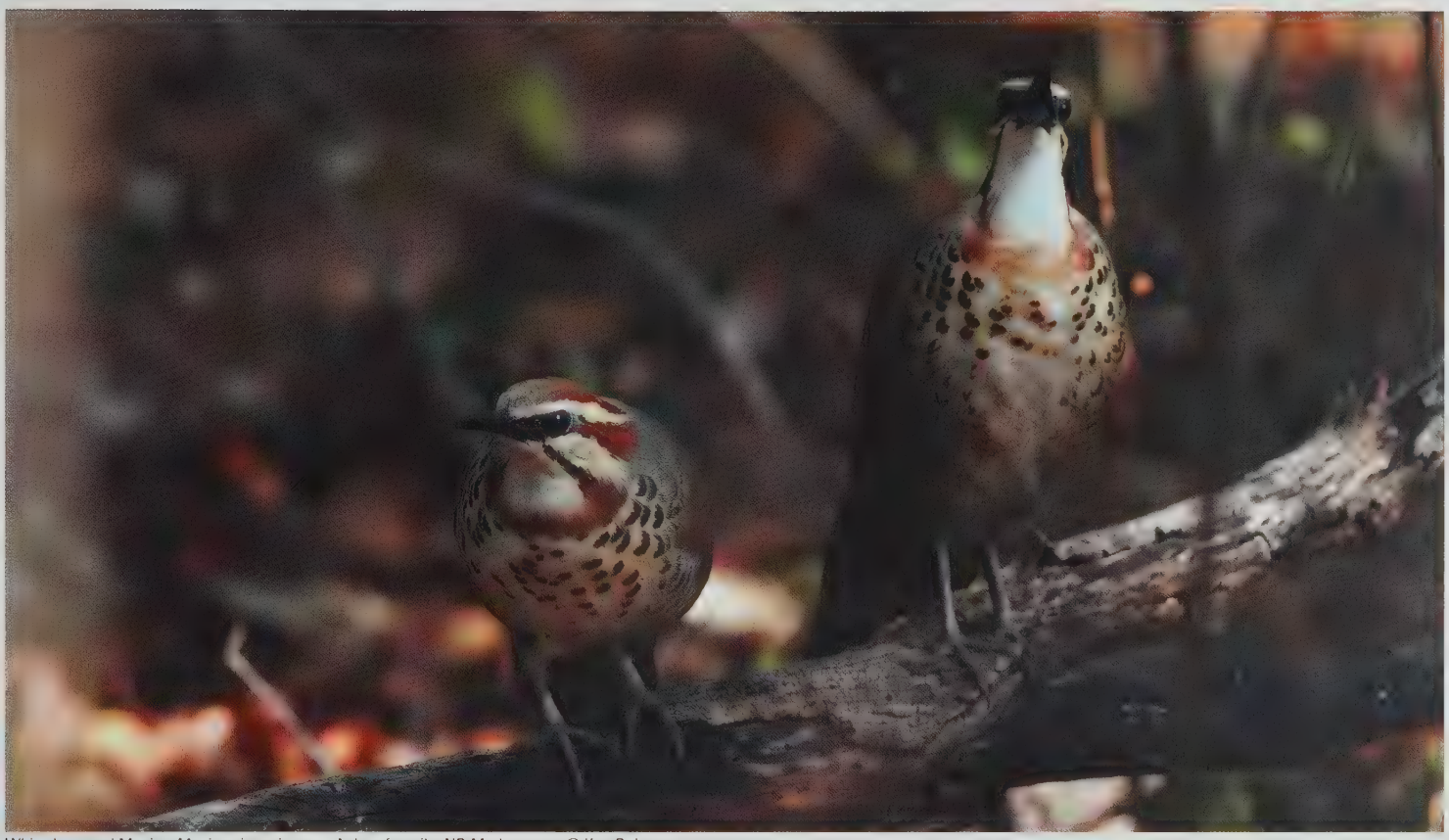
Subdesert Mesite, *Monias benschi*.
Near Ifaty, Madagascar. © Dubi Shapiro.



Enigmatic, and poorly known, the mesites are a group of songbird-sized non-passerines endemic to Madagascar. Mesites seldom fly, spending most of their time on or very near the ground. They have a long to very long tail with long and full coverts, which, together with their horizontal carriage, give the mesites a distinctive appearance in the field. Birds of the nominate genus, *Mesitornis*, have a small round head that makes them look like doves; they are limited to declining rainforests, where they forage in the undergrowth and litter. *Monias* is like a long-legged, sharp-billed thrasher that walks through semi-arid spiny forest, giving a deep wag of the tail with nearly every step.



Subdesert Mesite, *Monias benschi*. Reniala Reserve, Ifaty, Madagascar. © Francesco Veronesi.



White-breasted Mesite, *Mesitornis variegatus*. Ankarafantsika NP, Madagascar. © Ken Behrens.

**Conservation** Habitat destruction, mostly through conversion to agriculture, threatens the survival of all three mesite species (100%; 3 VU).

**Relationships** The mesites are placed in their own family and order (Mesitornithiformes). Mesitornithidae was long thought to be grouped in Gruiformes, but morphological characters have alternatively suggested that they are allied to Turnicidae, Rallidae, and Charadriiformes (Livezey & Zusi 2007). Recent molecular data suggest that the mesites are not at all closely related to any of these groups, but fall instead within a large clade sometimes termed the "metaves" (Ericson *et al.* 2006a, Fain & Houde 2007, Hackett *et al.* 2008). Although relationships within this ancient group are not well resolved, the most recent analyses suggest that mesites are closest to Columbidae (Hackett *et al.* 2008) or Pteroclidae (Jarvis *et al.* 2014).



Brown Mesite, *Mesitornis unicolor*. Ranomafana NP, Madagascar. © Jon Irvine.

*MESITORNIS*
2 species



*M. unicolor*
Brown Mesite

*MONIAS*
1 species



*M. benschi*
Subdesert Mesite

# Order: PTEROCLIFORMES

## PTEROCLIDAE
Sandgrouse

2 genera • 16 species

Related Families Columbidae (doves and pigeons), Mesitornithidae (mesites)

Similar Birds Doves (Columbidae), grouse and quails (Phasianidae), seedsnipes (Thinocoridae)

Description
- Plumage earth-toned, with accents and pattern in darker or lighter colors
- Wings long, pointed; tail and tail coverts long
- Body small to medium, ovoid, dove-like
- Bill short, conical
- Head small, often with bare colored skin around the eye; neck medium length
- Legs short, with feathered tarsi; toes short, broad, and heavily padded with short broad nails
- Males slightly larger and more brightly patterned than females

Habitat Sandgrouse occupy deserts and arid grasslands, and they need to drink water every day. Nonetheless, they range as far as 70 km from the nearest water source, and to drink they may fly to and fro up to 150 km a day.

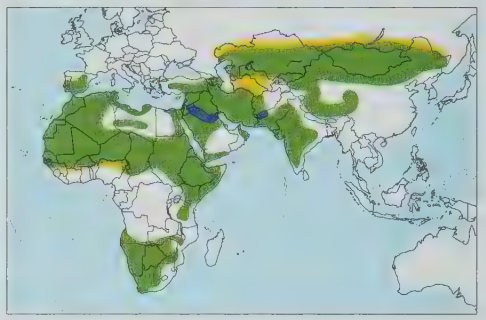
Food Pteroclids feed almost exclusively on seeds, occasionally eating buds and other plant material. Their food is typically fairly dry, thus necessitating their daily treks to and from water sources.

Breeding Sandgrouse are monogamous with biparental care. Their nests are simple scrapes in the ground in which females typically lay 3 eggs. Both parents share the task of incubating eggs, which takes 20 to 25 days, and caring for the chicks, which are able to leave the nest and feed themselves just one day post-hatching. The male and female stay near each other, each accompanied by a chick or two, showing the chicks food and watching for predators. The chicks are able to fly at an age of four weeks, when they are still only about half of adult size. Because chicks are unable to fly for a month after hatching, they cannot undertake the long-distance daily commute to water that the adults typically make. To overcome this obstacle, adult male sandgrouse carry water to their chicks by soaking up water in their breast feathers, which, for their mass, can hold three to four times more water than a modern



Lichtenstein's Sandgrouse, *Pterocles lichtensteinii*. Bilen Lodge, Afar, Ethiopia. © Ian Davies.





In the arid, treeless expanses of the Old World live the enigmatic sandgrouse. These birds are dove-like in profile and subsist in some of the driest habitats on diets largely of seeds. They forage in flocks, which often grow much larger when the birds congregate at water sources at the ends of the day. Despite tradition to the contrary, these birds do not appear to suck water like columbids, but rather conduct water into the esophagus by repeatedly raising the head with beakfuls of water. The birds are monogamous and nest far from water, but the males especially have belly feathers adapted to hold water that can be flown back to the thirsty chicks near the nest.



Namaqua Sandgrouse, *Pterocles namaqua*. Etosha NP, Namibia. © Francesco Veronesi.

sponge. Chicks finally start flying to water with the family at an age of about two months.

**Conservation** There are no immediate conservation concerns for any of the sandgrouse. Although some population-level declines related to changing farming practices are significant, especially in Europe, they do not yet appear to affect the prospects of any of the species as a whole.

**Relationships** The sandgrouse are the only members of Pterocliformes. Previously, Pteroclidae has been grouped with a variety of other families, including Phasianidae, Columbidae, and various families in Charadriiformes (Cracraft 1981, Livezey & Zusi 2001, 2007). Recent molecular studies have not fully clarified their relationships, but they do refute some previous hypotheses; for example, Pteroclidae is not close to Charadriiformes (Ericson *et al.* 2003a, Baker *et al.* 2007a, Fain & Houde 2007, Hackett *et al.* 2008, Jarvis *et al.* 2014). The sandgrouse appear to represent a relatively ancient lineage that falls within a group called informally the "metaves," which includes grebes, flamingos, doves and pigeons, and mesites. Within this group, Pteroclidae appears to form a clade with Columbidae and Mesitornithidae, and is sister either to Mesitornithidae (Jarvis *et al.* 2014) or to a clade made up of Columbidae plus Mesitornithidae (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Madagascar Sandgrouse, *Pterocles personatus*. Ankilibe, Atsimo-Andrefana, Madagascar. © Nick Athanas.



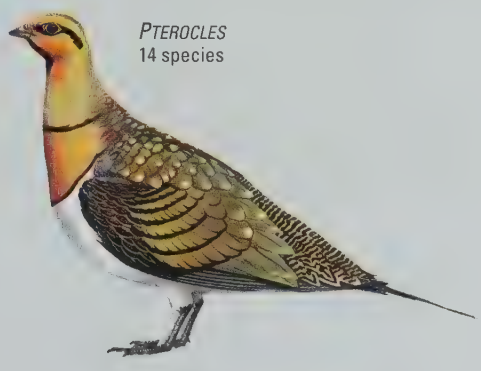
Chestnut-bellied Sandgrouse, *Pterocles exustus*. Kalapatti, Tamil Nadu, India. © Varun HB.

*SYRRHAPTES*
2 species



*S. paradoxus*
Pallas's Sandgrouse

*PTEROCLES*
14 species



*P. alchata*
Pin-tailed Sandgrouse

# Order: CAPRIMULGIFORMES

## Families: Steatornithidae, Nyctibiidae, Podargidae, Caprimulgidae, Aegothelidae, Hemiprocnidae, Apodidae, Trochilidae

As treated here, the order Caprimulgiformes comprises eight families, including three—the swifts (Apodidae), treeswifts (Hemiprocnidae), and hummingbirds (Trochilidae)—that have traditionally been separated into the order Apodiformes. Caprimulgiformes had consisted of five families (Steatornithidae, Podargidae, Nyctibiidae, Caprimulgidae, and Aegothelidae), while Apodiformes traditionally contained the aforementioned three. Morphological evidence suggested that the traditional Caprimulgiformes is sister to either Strigiformes (owls) or Apodiformes. Cracraft (1981) argued for a sister relationship between Caprimulgiformes and Apodiformes based on extensive shared morphological characters. Some later workers suggested that Caprimulgiformes is paraphyletic, based in part on the high degree of divergence between the Oilbird (Steatornithidae) and potoos (Nyctibiidae) in their morphology (Livezey & Zusi 2001, 2007, Braun & Huddleston 2009). Early molecular phylogenetic work on this order also indicated surprisingly high levels of genetic divergence (Sibley & Ahlquist 1990, Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Braun & Huddleston 2009), further strengthening the possibility that it was paraphyletic.

There has been less attention to relationships among the traditional Apodiformes, but morphological and genetic studies (Cracraft 1981, Sibley & Ahlquist 1990, Ericson *et al.* 2006a, Hackett *et al.* 2008) support both a sister relationship between Apodidae and Hemiprocnidae and their collective sister relationship to Trochilidae.

Several recent phylogenetic studies have suggested that the owlet-nightjars (Aegothelidae) belong within the traditional Apodiformes (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009). This placement renders the traditional narrower Caprimulgiformes paraphyletic. Although other studies have found conflicting results, the most intensively sampled phylogenies generated to date include a well-supported and monophyletic Caprimulgiformes (including Apodiformes), with Aegothelidae sister to the three traditional apodiform families (Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009).



Crested Treeswift, *Hemiprocne coronata*.
Kotagiri, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.



Green-throated Carib, *Eulampis holosericeus*.
Five Islands Peninsula, Antigua. © Piotr Jonczyk.

Caprimulgiformes

## STEATORNITHIDAE
Oilbird

1 genus • 1 species

**Related Families** Nyctibiidae (potoos)

**Similar Birds** Nightjars (Caprimulgidae), potoos (Nyctibiidae), frogmouths (Podargidae)

**Description**
- Plumage stiffer and harder than in other nocturnal caprimulgiform birds, rufous brown with large, crisp white spots on the wing coverts; prominent rictal bristles
- Wings long, pointed; tail long, rounded, and graduated
- Body medium-sized, cylindrical
- Bill medium-long, wide-gaped, strongly hooked
- Head large; neck short
- Legs short; feet with long toes, sharp claws
- Male grayer and darker brown than the more-rufous female

**Habitat** Oilbirds forage in tropical and subtropical rainforests that have fruiting trees year-round, and they nest and roost in caves.

**Food** Oilbirds are completely frugivorous, feeding primarily on the fruits of three plant families, the Lauraceae, Palmae, and Burseraceae. Fruits consumed by Oilbirds are generally very high in fat and energy content.

**Breeding** Oilbirds are monogamous with biparental care, appearing to form long-term pair bonds with their mates. Nests of Oilbirds consist of a cemented cup of fruit pulp, fruit seeds, and excrement, all held together with the saliva of the Oilbird. Nests are reused year after year by pairs. Female Oilbirds typically lay 1 to 4 eggs, depending on location, and perhaps on site-specific differences in fruit availability. Both parents are active in all aspects of parental care, from nest construction and incubation to feeding chicks. Chicks hatch after 32 to 35 days of incubation, and, because of their exclusively fruit-based, low-protein diet, they grow slowly to fledging at 90 to 120 days.



Oilbird, *Steatornis caripensis*.
Chontal, Pichincha, Ecuador. © Benjamin Van Doren.

**Conservation** Oilbirds face no immediate conservation concerns.

**Relationships** The Oilbird clearly belongs in Caprimulgiformes, but its distinctive morphology has clouded its relationships to others in this group. Different analyses of morphological characters have suggested that Steatornithidae is closely related to Nyctibiidae and Caprimulgidae (Cracraft 1981), or, alternatively, sister to Podargidae (Livezey & Zusi 2007) or to all the other Caprimulgiformes (Mayr 2010, Mayr 2011). Recent molecular phylogenetic analyses (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Braun & Huddleston 2009) indicate that Steatornithidae is sister to Nyctibiidae (Han 2006, Hackett *et al.* 2008, Han *et al.* 2010) and that these two families together are sister to the rest of Caprimulgiformes.

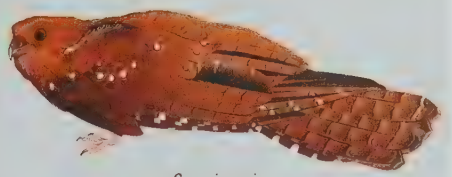


The Oilbird is an exceptional bird in an already idiosyncratic group. It is the only night bird that subsists entirely on fruit, and it has a wonderful and extreme sensory arsenal: an excellent sense of smell (used to locate aromatic fruit), the most sensitive eyes of any known vertebrate (which help it find palm fruits and negotiate long nocturnal flights), and a fully functional echolocation system based on vocal clicks (allowing it to navigate the crowded interiors of the caves where up to thousands of these birds nest in colonies). The chicks are fed a diet of palm fruit, so oily that the chicks were once collected and boiled down for lamp oil.



Oilbird, *Steatornis caripensis*. Chontal, Pichincha, Ecuador. © Nick Athanas.

*STEATORNIS*
1 species



*S. caripensis*
Oilbird

# NYCTIBIIDAE
## Potoos

1 genus • 7 species

**Related Families** Steatornithidae (Oilbird)

**Similar Birds** Frogmouths (Podargidae), owlet-nightjars (Aegothelidae), nightjars (Caprimulgidae)

**Description**
- Plumage mostly brown or gray and very cryptically patterned with black and white; no rictal bristles but bristle-tipped loral feathers
- Wings, tail long
- Body small to medium, long and almost cylindrical
- Bill thin, delicate, with short decurved tip and a very broad gape
- Head large and eyes very large; neck short
- Legs short with short toes
- Sexes similar

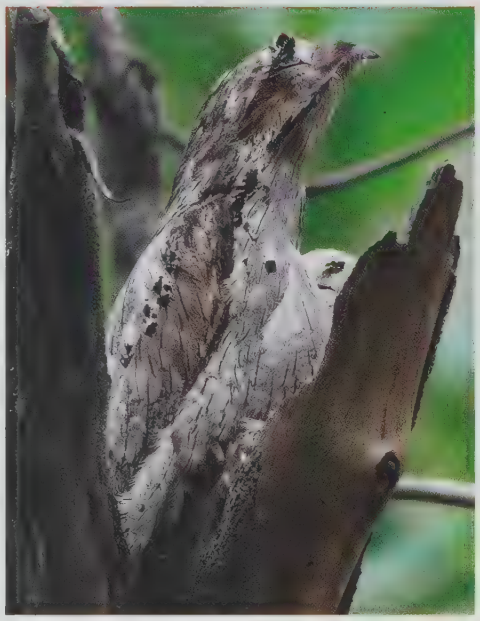
**Habitat** Potoos inhabit forests and woodlands throughout most of the Neotropics.

**Food** Potoos feed almost exclusively on insects. They hunt only at night, sallying out from a relatively exposed perch to catch flying insects.

**Breeding** Potoos are monogamous with biparental care, and their nests are simply a location in a depression on a branch, often in a knot hole. No nest is built, and incubating birds carefully position themselves to conceal the single-egg clutch. The chick hatches after more than a month of incubation, and is likewise concealed as it is brooded. Starting about a month post-hatch, it is left alone on the nest-branch during the day and is fed by the parents only at night. Both parents are active in feeding the chick.

**Conservation** No potoos face any immediate conservation concerns.

**Relationships** The potoos clearly belong in Caprimulgiformes, but their placement within this order has varied among recent molecular and morphological studies (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Han *et al.* 2010, Mayr 2010, Mayr 2011). Of the recent molecular studies, the clearest signal is that Nyctibiidae is sister to Steatornithidae, and these two taken together are sister to the remaining caprimulgiform families (Hackett *et al.* 2008) though morphological studies suggest a close relationship with Caprimulgidae (Mayr 2011). We choose to follow Hackett *et al.* (2008) in our treatment, placing potoos as sister to Oilbird.



Common Potoo, *Nyctibius griseus*.
Reserva Ecológica de Guapiaçu, Brazil. © Dubi Shapiro.





Potoos are night birds that favor exposed perches during the day, trusting their safety to their extraordinarily cryptic plumage. With feathering that resembles furrowed bark covered in lichen, an upturned profile, and a highly reduced bill, these birds often mimic a broken branch stub. At night, they emit distinctive songs, from the plaintive whistles of the Common Potoo *Nyctibius griseus* to the percussive guttural roar of the Great Potoo *N. grandis*. They respond well to tape playback of their songs, often approaching closely and replying repeatedly, and their highly reflective eyes make them relatively easy to find at night. These characteristics have allowed us to document their distribution far better than any other aspect of their biology.



Great Potoo, *Nyctibius grandis*. Fazenda Santa Tereza, Brazil. © Adam Riley / Rockjumper Birding Tours.

*NYCTIBIUS*
7 species



*N. griseus*
Common Potoo

Caprimulgiformes

# PODARGIDAE
## Frogmouths

3 genera · 14 species

**Related Families** Caprimulgidae (nightjars and nighthawks), Aegothelidae (owlet-nightjars), Hemiprocnidae (treeswifts), Apodidae (swifts), Trochilidae (hummingbirds)

**Similar Birds** Potoos (Nyctibiidae), Oilbird (Steatornithidae), owlet-nightjars (Aegothelidae)

**Description**
- Plumage mostly brown, often with white, black, and reddish accents to create cryptic pattern
- Wings rounded; tail long with central rectrices slightly longer and more pointed
- Body medium-sized, chunky, and cylindrical
- Bill broad, deep, triangular, wide-gaped, hooked, with bristles at base
- Head large; neck short, thick
- Legs short; feet small, weak
- Sexes similar

**Habitat** Most podargid species live in forested habitats, but some make it into more open habitats, such as second growth and wooded savanna.

**Food** The frogmouths feed primarily on insects, particularly beetles, grasshoppers, and moths. The larger species will also feed on small vertebrates, such as small rodents and lizards. Frogmouths are nocturnal, and typically hunt by flying from tree to tree and pouncing on their prey on the ground. Larger items are beaten against a hard surface before swallowing them.

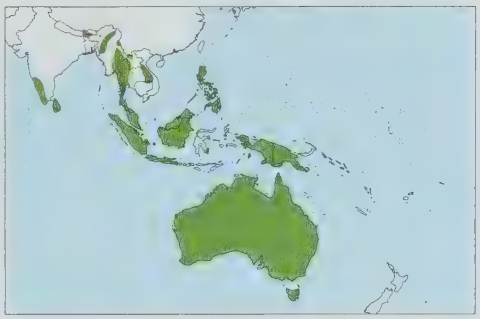
**Breeding** The frogmouths are monogamous with biparental care. Detailed information on the breeding biology of this family as a whole, however, is lacking, especially in the genus *Batrachostomus*, and much of what we know comes from studies of the Tawny Frogmouth *Podargus strigoides*. The nests of the podargids are simple structures. *Podargus* species construct a mass of sticks in a basic cup, or in a platform nest on a branch or in the upward fork of a branch. Asian frogmouth nests are smaller, consisting of a shallow cup of bark, down, spiderwebs, and lichen built on a horizontal branch. Frogmouths typically lay 1 to 3 eggs, and rarely 5. Both male and female frogmouths participate in nest construction, incubation, brooding, and feeding the chicks. Incubation takes about a month. Frogmouth chicks are brooded by a parent for up to three weeks after hatching, and they leave the nest after about a month.

**Conservation** Extensive habitat loss, especially in lowland forests, is probably responsible for



Philippine Frogmouth, *Batrachostomus septimus*. Mount Kitanglad, Mindanao, Philippines. © Adrian Constantino.





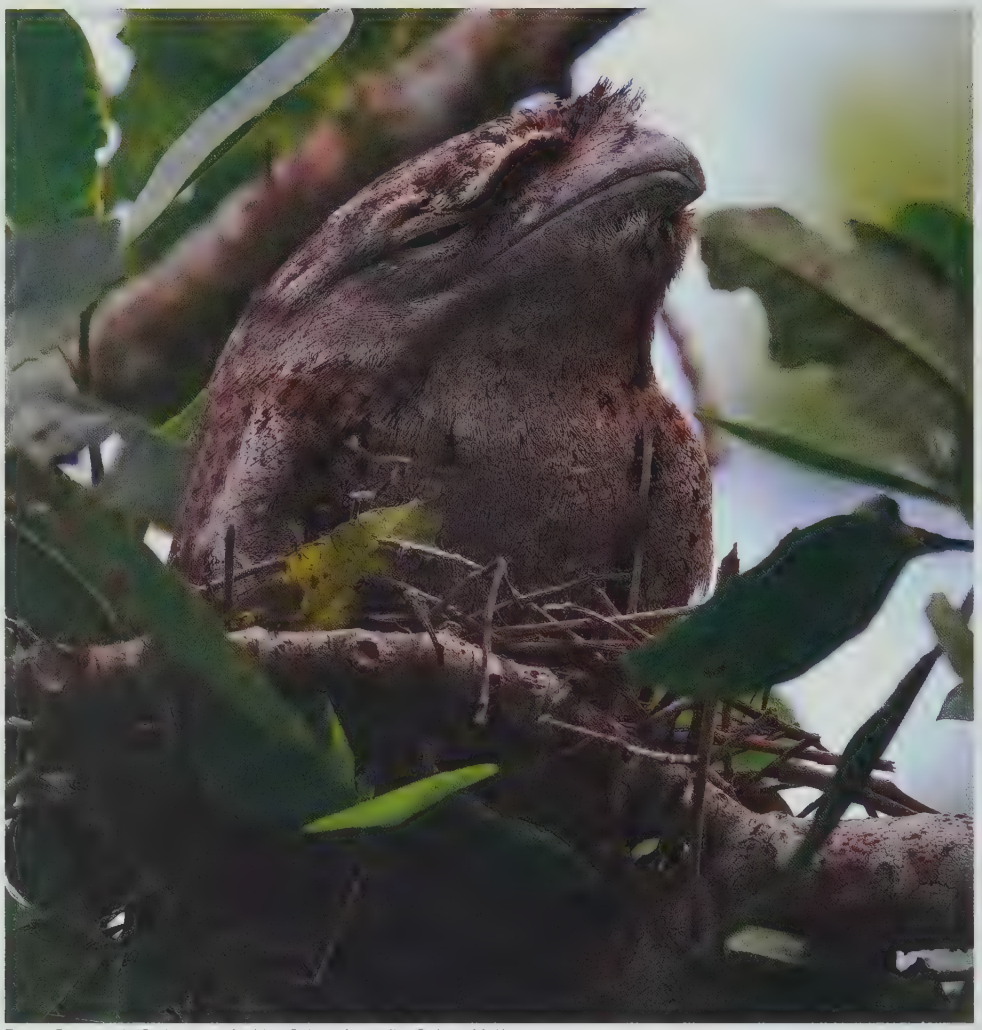
The burly brutes of the caprimulgiforms, frogmouths are much less aerial than most of their relatives. Cryptically colored, they sit quietly by day, often tamely revisiting the same perch for many days at a time, despite visits from human observers. At night, they wait watchfully for passing prey, then pounce on it, subduing it on the ground or a tree trunk. With their massive—though fairly light—bill, they consume just about any animal they can swallow. This family includes two subfamilies divided neatly by Wallace's Line, the birds in Asia being lighter of build, more diverse, much harder to find, and thus less well known, than their cousins in Australia and New Guinea.



Horsfield's Frogmouth, *Batrachostomus javensis*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

the declines of six frogmouths (43%), all in the genus *Batrachostomus* (6 NT).

Relationships Podargidae is clearly included in Caprimulgiformes, but like many other families in this group, its placement within the order is not well resolved. Recent studies have alternatively placed frogmouths as sister to nightjars (Barrowclough *et al.* 2006, Han 2006); as sister to a larger clade containing nightjars, swifts, hummingbirds, and owlet-nightjars (Hackett *et al.* 2008); as sister to a clade including the potoos and Oilbird (Han *et al.* 2010); or as sister to all caprimulgiforms except Oilbird (Mayr 2011). We provisionally accept here the placement suggested by Hackett *et al.* (2008). At times the *Podargus* species of Australo-Papua have been split as a separate family from the *Batrachostomus* species of Asia, but recent studies (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008, Braun & Huddleston 2009, Han *et al.* 2010) reinforce the sister relationship between them and we have opted, as have others (Cracraft 2013, Clements *et al.* 2014), to keep them together in one family for now.



Tawny Frogmouth, *Podargus strigoides*. Cairns, Australia. © John McKean.

*PODARGUS*
3 species



*P. strigoides*
Tawny Frogmouth

*RIGIDIPENNA*
1 species



*R. inexpectata*
Solomons Frogmouth

*BATRACHOSTOMUS*
10 species



*B. septimus*
Philippine Frogmouth

Caprimulgiformes

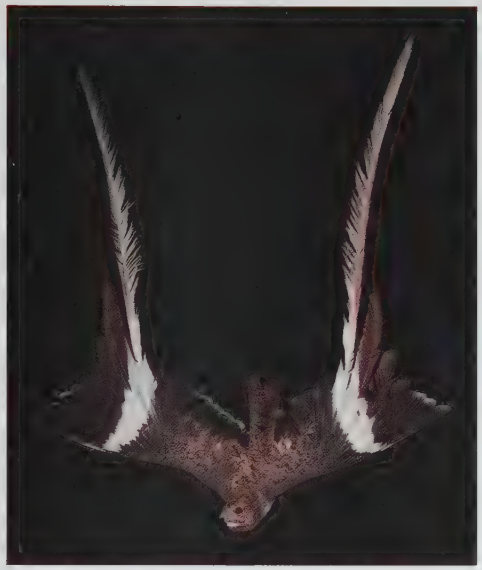
## CAPRIMULGIDAE
Nightjars and Nighthawks

20 genera • 98 species

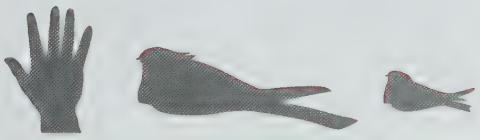
**Related Families** Aegothelidae (owlet-nightjars), Hemiprocnidae (treeswifts), Apodidae (swifts), Trochilidae (hummingbirds)

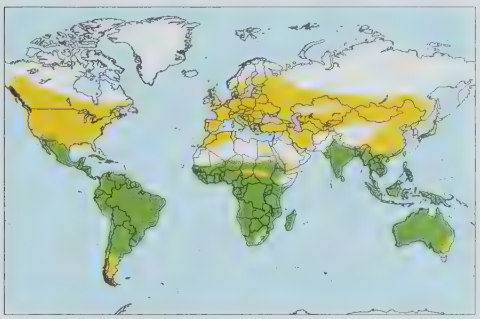
**Similar Birds** Potoos (Nyctibiidae), frogmouths (Podargidae)

**Description**
- Plumage soft, cryptic brown tones; long rictal bristles
- Wings variably long (pointed in some species); tail medium to long
- Body small, cigar-shaped, though more rounded than that of swifts
- Bill short, delicate, wide-gaped
- Head large, with large eyes
- Legs short; toes, claws small, that of middle toe pectinate
- Sexes generally similar; with males averaging slightly more contrasting white in plumage and in a few species with lengthened tail or wing feathers for display



Pennant-winged Nightjar, *Caprimulgus vexillarius*. Mushumbi Pools, Zimbabwe. © Hugh Chittenden.





**Habitat** Caprimulgids live in a wide variety of habitats, from forest, to desert, to densely settled cities. Nighthawks (*Chordeiles*) are particularly well known for inhabiting cities, nesting on gravel rooftops and hunting insects by large lights at night.

**Food** Caprimulgids are all aerial insectivores, taking exclusively insects. With their enormous mouths, nightjars can catch insects that are quite large, including large grasshoppers and moths.

**Breeding** Because caprimulgids are mostly nocturnal, and very cryptic, there is not a great deal of information available on the breeding biology of most species. Most nightjars lay their eggs on the ground, often on leaf litter or gravel, without the addition of any nesting material. Caprimulgids do not typically even make a scrape in the ground in which to lay their eggs. Across the family, eggs are generally light-colored, with darker blotches and spots in many species, but tightly sitting adults probably provide the greatest protection against discovery by predators. Most caprimulgids lay 1 or 2 eggs, which are incubated for 16 to 22 days. The chicks are capable of moving around in the nest vicinity from an early age but unable to regulate their own body temperature until quite well developed. Both parents aid in incubation and chick-rearing duties.

**Conservation** Most species of caprimulgids face no imminent conservation concerns. However, 15 species (15%) do, mainly because of habitat destruction and introduced predators (6 NT, 4 VU, 3 EN, 2 CR(PE)). Especially rare are two Caribbean species: the Jamaican Poorwill *Siphonorhis americana* has not been definitively

Caprimulgids are perhaps best known for their distinctive calls that punctuate the night. Their nocturnal habits, cryptic plumage, and often-camouflaged eggs leave much unknown about the breeding habits or conservation status of many species. Nightjars and nighthawks find their prey of nocturnal insects by sight even in the dimmest of light levels. Sight clearly plays an important role in mate-finding, too, as sexual selection in these birds of the night has led to a diversity of visual signals, including long tail plumes or rackets from wing feathers in males. Their enormous mouths and jarring calls have earned them the common names of goatsuckers and nightjars.



Sand-colored Nighthawk, *Chordeiles rupestris*. Aguarico River, Ecuador-Peru border. © Nick Athanas.

recorded since 1860 and may well be extinct already, and the Puerto Rican Nightjar *Caprimulgus noctitherus* is restricted to small fragments of native forest in Puerto Rico. The New Caledonian Nightjar *Eurostopodus exul*, known from only a single specimen collected in 1939, may already be extinct.

**Relationships** The affinities of Caprimulgidae within Caprimulgiformes are not conclusively established (Ericson *et al.* 2006a, Braun & Huddleston 2009, Hackett *et al.* 2008, Han *et al.* 2010, Mayr 2011). Some have found caprimulgids to be sister to frogmouths (Barrowclough *et al.* 2006, Han 2006), while morphological evidence suggests caprimulgids may be sister to Nyctibiidae (Mayr 2010, Mayr 2011). We tentatively have followed Hackett *et al.* (2008) in assuming caprimulgids to be sister to the traditional Apodiformes plus Aegothelidae. At times, Caprimulgidae has been split into two families, the traditional nightjars and nighthawks forming Caprimulgidae, and the eared nightjars, an Australasian group, separated as the family Eurostopodidae. We prefer to retain these sister clades as subfamilies instead (Barrowclough *et al.* 2006, Han 2006, Braun & Huddleston 2009, Han *et al.* 2010).



Fiery-necked Nightjar with chick, *Caprimulgus pectoralis*. Panda, Mozambique. © Hugh Chittenden.

## Subfamily **EUROSTOPODINAE**

*EUROSTOPODUS*
7 species



*E. argus*
Spotted Nightjar

*LYNCORNIS*
2 species



*L. macrotis*
Great Eared Nightjar

## Subfamily **CAPRIMULGINAE** (1 of 2)

*GACTORNIS*
1 species



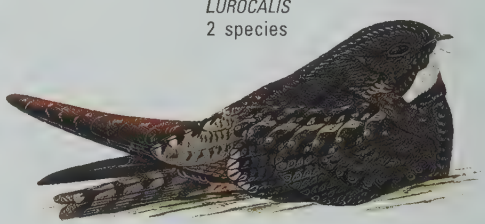
*G. enarratus*
Collared Nightjar

*CHORDEILES*
6 species



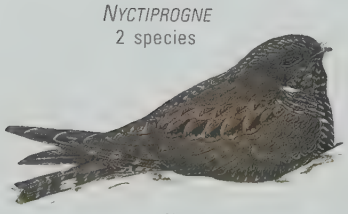
*C. minor*
Common Nighthawk

*LUROCALIS*
2 species



*L. semitorquatus*
Short-tailed Nighthawk

*NYCTIPROGNE*
2 species



*N. leucopyga*
Band-tailed Nighthawk

*NYCTIPOLUS*
2 species



*N. hirundinaceus*
Pygmy Nightjar

*SYSTELLURA*
3 species



*S. longirostris*
Greater Band-winged Nightjar


NYCTIDROMUS
2 species
N. albicollis
Pauraque
ELEOTHREPTUS
2 species
E. anomalus
Sickle-winged Nightjar
UROPSALIS
2 species
U. lyra
Lyre-tailed Nightjar
HYDROPSALIS
4 species
H. torquata
Scissor-tailed Nightjar
MACROPSALIS
1 species
M. forcipata
Long-trained Nightjar
SETOPAGIS
4 species
S. parvula
Little Nightjar
SIPHONORHIS
2 species
S. brewsteri
Least Poorwill
NYCTIPHRYNUS
4 species
N. ocellatus
Ocellated Poorwill
PHALAENOPTILUS
1 species
P. nuttallii
Common Poorwill
ANTROSTOMUS
12 species
A. rufus
Rufous Nightjar
CAPRIMULGUS
38 species
C. europaeus
European Nightjar
VELES
1 species
V. binotatus
Brown Nightjar

Caprimulgiformes

# AEGOTHELIDAE

Owlet-nightjars

1 genus · 10 species

**Related Families** Hemiprocnidae (treeswifts), Apodidae (swifts), Trochilidae (hummingbirds)

**Similar Birds** Frogmouths (Podargidae), potoos (Nyctibiidae), owls (Strigidae), nightjars (Caprimulgidae)

**Description**

- Plumage brown, gray, and black, cryptically patterned with spots and barring
- Wings long and rounded; tail long, graduated, and wedge-shaped
- Body small, thick, ovoid
- Bill short, flat, and wide-gaped, strongly hooked; rictal bristles prominent; loral bristles with hair-like barbs
- Head small to medium; eyes large and front-facing
- Legs medium length; toes long and slender with long claws
- Sexes similar

**Habitat** Owlet-nightjars live in forested and woodland habitats, and the Australian Owlet-Nightjar *Aegotheles cristatus* extends into more open, dry scrubland.

**Food** A wide variety of insect prey has been found in the diet of the Australian Owlet-nightjar, the only species for which a relatively comprehensive natural history accounting is available. Owlet-nightjars are nocturnal and hunt either by sallying for insects from a perch or less commonly by walking on the ground and picking arthropods from the ground.

**Breeding** Owlet-nightjars are monogamous with biparental care. They nest in cavities or hollows in trees, but will also nest in tree stumps, fallen logs, cavities in banks, and even artificial nest-boxes. Nests consist of a thin layer of leaves and bark inside the cavity, and owlet-nightjars lay 3 to 4 eggs. It appears that females incubate, with the help sometimes of the male. Nonetheless, both sexes are known to feed the chicks, predominantly at night, and at very high rates.

**Conservation** Habitat destruction and predation by introduced predators are likely causes of the decline of the New Caledonian Owlet-nightjar *A. savesi*, the only owlet-nightjar species (10%) with immediate conservation concerns (1 CR). Known only from a handful of historical specimens, the bird was rediscovered in 1998, but has not been seen or heard since. It is presumed to be extant, albeit in very small numbers, in a very small remote area of the island. It should be noted that two species lack sufficient data for making informed decisions on their population status.



Feline Owlet-nightjar, *Aegotheles insignis*. Arfak Mountains, West Papua, New Guinea. © Rob Hutchinson / Birdtour Asia.



These small night birds of Australia and New Guinea do indeed have a distinctive appearance somewhere in between a small owl and a nightjar. The species vary in the extent of their facial bristles and plumes, with the most extreme members of this group peering out through a chaotic tangle of filamentous feathers. Like birds in most of the other caprimulgiform families, owlet-nightjars can enter a state of torpor if food is scarce and temperatures low. Despite their highly specialized nocturnal lifestyle, analyses of both morphology and DNA indicate that they bear a closer evolutionary relationship to the swifts than to the other nocturnal members of this order.

**Relationships** The owlet-nightjars fall within the Caprimulgiformes as the order is defined here, although the affinities of Aegothelidae within this order have recently been a source of debate. Traditionally, they have been considered part of the narrower Caprimulgiformes (Cracraft 1981), with one recent study based on morphological characters placing them sister to the clade containing these families (Livezey & Zusi 2007). In contrast, several recent molecular phylogenetic studies have supported a sister relationship between the owlet-nightjars and the traditional Apodiformes: the swifts, treeswifts, and hummingbirds (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009). This sister relationship with the former Apodiformes has been supported by recent morphological studies (Mayr 2010, Mayr 2011), and it is one of the principal rationales for including the former Apodiformes here in an expanded Caprimulgiformes.



Australian Owlet-nightjar, *Aegotheles cristatus*. Murgon, Queensland, Australia. © B. G. Thomson.

***AEGOTHELES***
**10 species**



*A. crinifrons*
Moluccan Owlet-nightjar

Caprimulgiformes

# HEMIPROCNIDAE
## Treeswifts

1 genus • 4 species

**Related Families** Apodidae (swifts), Trochilidae (hummingbirds)

**Similar Birds** Swifts (Apodidae), swallows (Hirundinidae), woodswallows (Artamidae)

**Description**
- Plumage generally gray or brown with patches of iridescent blue or green, especially on head, wings, and back; flank patch of silky feathers
- Wings long and pointed; tail long and forked, with the outer feathers slender
- Body small, cylindrical, swift-like
- Bill short, flat, triangular, with a broad gape
- Head small to large, with distinct crest or "whisker" plumes on face in most
- Legs short, with delicate feet and long toes
- In some species, males have iridescent mantles and a rufous ear-covert patch

**Habitat** Treeswifts live in wooded habitats from open woodlands and forest edge to dense rainforest, where they forage for insects above the canopy.

**Food** Treeswifts are exclusively insectivores, taking a wide variety of flying insects on the wing and sometimes from the surface of leaves in the canopy. They sometimes limit their foraging to a nesting territory as small as the canopy of a single tree.

**Breeding** Treeswifts appear to be monogamous, with biparental care. They build a small half-nest, which fits only a single large egg. Nests are placed on the side of a thin horizontal branch, glued there with saliva. Nests are constructed mainly of feathers, bark, and moss and lichen, all glued together with saliva. Both parents are active in all aspects of parental care, from nest construction through incubation and brooding, to feeding the chick, and limited data indicate that incubation takes about three weeks, fledging about four, and post-fledging care at least another three or so.

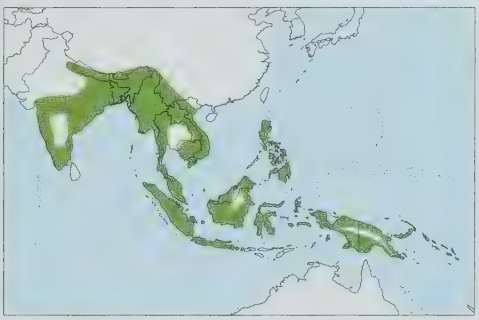


Crested Treeswift, *Hemiprocne coronata*.
Kotagiri, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.

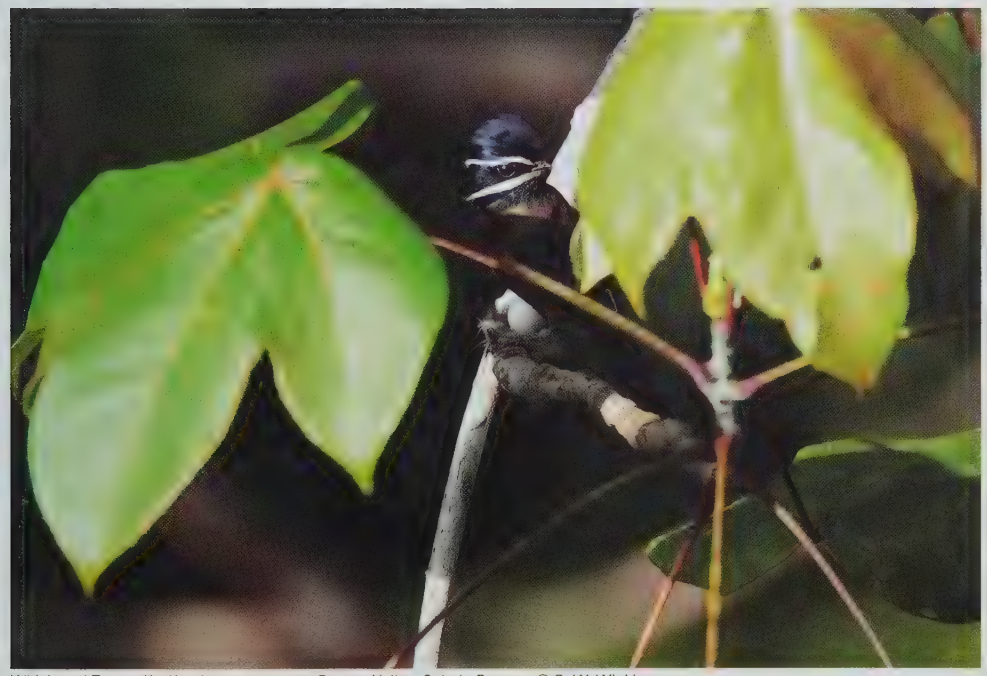
**Conservation** There are no immediate conservation concerns for any of the treeswifts.

**Relationships** Hemiprocnidae is in Caprimulgiformes, within which it is part of the clade that made up the traditional Apodiformes along with Apodidae and Trochilidae. The treeswifts are sister to the swifts, and these taken together are sister to the hummingbirds (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Mayr 2010, Mayr 2011). These three families taken together are sister to Aegothelidae (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Mayr 2010, Mayr 2011).





Treeswifts perch in trees and their feet resemble those of other perching birds. Their nest-building is unique, though. They use saliva to bind together their soft half-nest, then incubate while perching upright, making it less obvious to predators that they are incubating. Their forked tail and unusual feathered ornamentation on their faces or foreheads (hence their other common name, whiskered swifts) further distinguish them from the much more speciose Apodidae. Treeswifts spend less time flying than true swifts, and though they may fly somewhat more slowly and with deeper wing-strokes, their flight still most closely resembles that of the swifts.



Whiskered Treeswift, *Hemiprocne comata*. Danum Valley, Sabah, Borneo. © D. W. Winkler.

*HEMIPROCNE*
4 species



*H. mystacea*
Moustached Treeswift

Caprimulgiformes

## APODIDAE
Swifts

19 genera • 96 species

**Related Families** Hemiprocnidae (treeswifts), Trochilidae (hummingbirds)

**Similar Birds** Treeswifts (Hemiprocnidae), swallows (Hirundinidae), woodswallows (Artamidae)

**Description**
- Plumage generally dull gray-brown, many species with white markings on throat, tail, or rump
- Wings very long, pointed; tail short in most species, but may be long and forked or, alternatively, spine-tipped, in some
- Body tiny to small, compact, cylindrical fusiform
- Bill short, slightly decurved, with wide gape
- Head small, neck short
- Legs very short, with short, stout feet, pamprodactyl in some
- Sexes generally similar

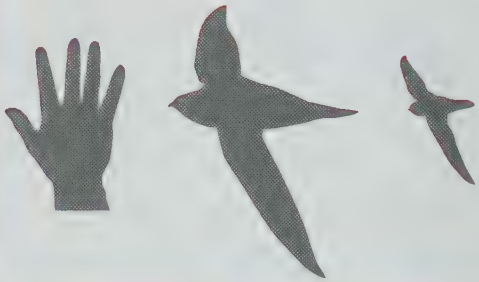
**Habitat** Swifts inhabit the full array of terrestrial habitats, but live mostly airborne, moving with air masses and local convection currents to take advantage of local concentrations of prey. Being reliant on aerial planktonic prey, they often travel far from their nests while foraging for themselves and their offspring.

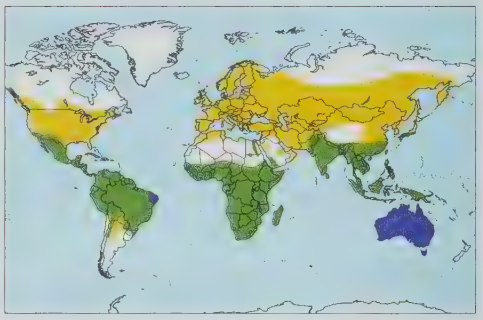
**Food** Swifts feed almost entirely on flying insects and other airborne arthropods.

**Breeding** Swifts are monogamous with biparental care. The nest locations of different swift species are diverse, with some species nesting in dark caves, some behind waterfalls, some under eaves of bridges and buildings, and some in hollowed-out trees. Although the nests of most swifts are attached to a vertical wall with either mud or saliva, this too can vary. Nest material includes mosses, liverworts, grass, sticks, feathers, plant down, and mud, often all glued together, and to the substrate, by adhesive saliva. In the extreme case (i.e., Edible-nest Swiftlets *Aerodramus fuciphagus*), the nest can be made entirely of saliva. In others (e.g., African Palm Swift *Cypsiurus parvus*), dried saliva holds the eggs to a vertical nest wall. Clutch size varies from 1 to 5 eggs, and both parents share all parental duties. Incubation takes two to four weeks and the nestling period six to ten weeks. One species has been reported to lay two 1-egg clutches 50 days apart, the second being incubated by the developing chick from the first. Many of the non-migratory species have long-term pair bonds, and at least one species breeds cooperatively, with retained helpers from previous breeding attempts.



Common Swift, *Apus apus*.
Lucca, Tuscany, Italy. © Ian Davies.





These masters of an aerial lifestyle forage on the rich array of plankton in the sky. Some species are so well adapted to their aerial pursuits that they cannot take off from flat ground, and some return to land only to reproduce. Using mud or adhesive saliva, swifts glue their nests—or eggs—to plants, walls, or cliff faces. These fascinating nest-building methods allow a steep descent for take-off while providing protection from predators. Like a few of their caprimulgiform relatives, some have developed echolocation for life in deep caverns and others survive periods of cold with no food by becoming torpid.



White-throated Swift, *Aeronautes saxatalis*. San Diego, California, USA. © Tom Johnson.

**Conservation** All of the 11 rare and declining apodid species (11%) are swiftlets (*Collocalia* and *Aerodramus*), many of which are island endemics already at risk from their small population sizes (6 NT, 4 VU, 1 EN). Introduced predators (especially brown tree snakes *Boiga irregularis*) and habitat destruction are concerns for these island endemics, which include the Mariana Swiftlet *C. bartschi* and Atiu Swiftlet *A. sawtelli*. Other swiftlet species are threatened by extensive collection of nests for food and medicinal purposes.

**Relationships** The swifts have traditionally been placed in the order Apodiformes, but here we include them within Caprimulgiformes on the basis of recent phylogenetic studies (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Mayr 2010, Mayr 2011). Although some of the divisions within this group remain controversial, there is broad consensus that the swifts are most closely related to the treeswifts (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Mayr 2010, Mayr 2011). These two families are in turn sister to the hummingbirds. These three families, which together constitute the traditional Apodiformes, are in turn most likely sister to the owlet-nightjars (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, Hackett *et al.* 2008, Braun & Huddleston 2009, Mayr 2010, Mayr 2011). This last sister-group relationship with a traditional caprimulgiform family is one of the factors that resulted in our decision to include the traditional Apodiformes here within Caprimulgiformes.



Fork-tailed Palm Swift, *Tachornis squamata*. Pantiacolla Lodge, Manu NP, Peru. © Mark A. Chappell.

## Subfamily CYPSELOIDINAE

*CYPSELOIDES*
8 species



*C. niger*
Black Swift

*STREPTOPROCNE*
5 species



*S. zonaris*
White-collared Swift


MEARNSIA
2 species
M. picina
Philippine Spinetail
ZOONAVENA
3 species
Z. grandidieri
Madagascar Spinetail
TELACANTHURA
2 species
T. ussheri
Mottled Spinetail
RHAPHIDURA
2 species
R. leucopygialis
Silver-rumped Spinetail
NEAFRAPUS
2 species
N. cassini
Cassin's Spinetail
CHAETURA
10 species
C. chapmani
Chapman's Swift
HIRUNDAPUS
4 species
H. caudacutus
White-throated Needletail
COLLOCALIA
3 species
C. esculenta
Glossy Swiftlet
HYDROCHOUS
1 species
H. gigas
Waterfall Swift
AERODRAMUS
23 species
A. fuciphagus
Edible-nest Swiftlet
SCHOUTEDENAPUS
2 species
S. myoptilus
Scarce Swift
AERONAUTES
3 species
A. saxatalis
White-throated Swift
TACHORNIS
3 species
T. squamata
Fork-tailed Palm Swift
PANYPTILA
2 species
P. sanctihieronymi
Great Swallow-tailed Swift
CYPSIURUS
2 species
C. parvus
African Palm Swift
TACHYMARPTIS
2 species
T. melba
Alpine Swift
APUS
17 species
A. apus
Common Swift

Caprimulgiformes

## TROCHILIDAE
### Hummingbirds

104 genera • 363 species

**Related Families** Apodidae (swifts), Hemiprocnidae (treeswifts)

**Similar Birds** Sunbirds (Nectariniidae)

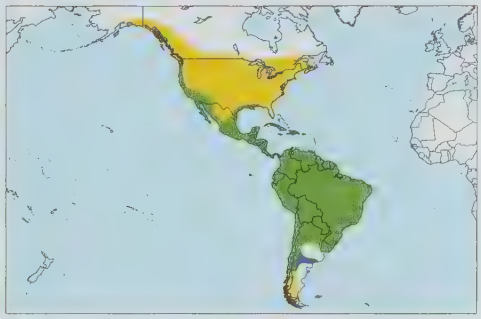
**Description**
- Plumage extraordinarily varied, often with brightly contrasting iridescent patches around head and throat (the "gorget")
- Wings long, narrow, pointed; tail ranging from short to much longer than the rest of the body
- Body tiny, cylindrical ovoid; includes smallest bird in the world (~2 g)
- Bill slender, pointed, often long, and in some strongly decurved
- Legs short with small, delicate feet
- Males more brightly colored and boldly patterned than females

**Habitat** Hummingbirds occur in a wide variety of habitats across the New World, from arid deserts, to dense tropical rainforests, to high Andean scrub near glaciers and snowfields.



Violet-tailed Sylph, *Aglaiocercus coelestis*. Mindo Loma Bird Lodge, Ecuador. © G. B. Baker.





**Food** Hummingbirds feed on nectar and small insects and other invertebrates. Although nectar is most important for all species, hummingbirds are remarkably effective insectivores, capturing small flying prey with their bills. The few studies available indicate that about 90% of a hummingbird's diet is composed of nectar, with 10% being small insects and other small arthropods. Nectar is required by hummingbirds to fuel their fast metabolism and maintain their body temperatures with such small body size.

**Breeding** Hummingbirds are polygynous, and males mate with multiple females over the course of a breeding season. Males court females either from leks or by defending a rich patch of nectar-bearing flowers, and the females tend to all aspects of parental care from nest-building on. Hummingbirds' small nests come in a variety of shapes and locations. The most typical nest is an open cup on a branch or branch-fork, but some build domed or partially domed nests, and many build pendant nests attached with spider silk to large overhanging leaves. Others build nests in niches in rock faces and cliffs. Spiderwebs are harvested and used in construction by many species, providing the adhesion to hold the nest together, and often to fasten lichens onto the outer surface of the nest as camouflage. Females typically lay 2 eggs, incubate the eggs solo for two to three weeks, and feed the chicks a diet of invertebrates and nectar until they fledge after three to six weeks.

**Conservation** Over 50 hummingbird species (15%) face serious conservation challenges (19 NT, 10 VU, 17 EN, 9 CR). Two species have gone extinct in the last 150 years, both *Chlorostilbon* species, each known only from a single

In the sugar-charged lives of the world's smallest birds, sexual selection has taken over, with males vying for mates by competing in leks or defending rich nectar resources. Hummingbirds showcase a dizzying array of plumages, almost all of which rely on odd tail plumes or the angle-sensitive iridescence of their feathers for their effect. The extreme maneuverability of these most acrobatic of birds seems to engender a lack of concern about predators, making them easy to approach near sources of food. Burning energy so fast during the day that most species cannot make it through the night on a stomach full of nectar, most go into torpor every night, even in tropical environments, to reduce energy loss.



Ecuadorian Hillstar, *Oreotrochilus chimborazo*. Antisana Volcano, Ecuador. © Dubi Shapiro.

specimen in the Caribbean. Another species, the Turquoise-throated Puffleg *Eriocnemis godini*, is known from six specimens in the 19th century and only one unconfirmed sighting near Quito in 1976. It is now feared to be extinct, and several other species in this genus are not doing much better. The Juan Fernandez Firecrown *Sephanoides fernandensis*, restricted to part of one tiny island off the coast of Chile, has a very small population that is declining because of continuing habitat degradation and predation by introduced mammals. All the other critically endangered taxa are pressured by continued habitat alteration coupled with very tiny endemic ranges and small population sizes.

Relationships The hummingbirds are part of the expanded Caprimulgiformes. Recent phylogenetic studies support the sister relationship between Trochilidae and the group formed by Apodidae plus Hemiprocnidae (Barrowclough *et al.* 2006, Ericson *et al.* 2006a, McGuire *et al.* 2007, Hackett *et al.* 2008, McGuire *et al.* 2009, Braun & Huddleston 2009). These three families have traditionally been grouped as the order Apodiformes, but here they are classified as a subset of a more inclusive Caprimulgiformes. Within Trochilidae, there are eight main clades. The topazes, Florisuginae, are sister to all other hummingbirds, and the hermits, Phaethornithinae, are sister to the remaining six clades (McGuire *et al.* 2007, McGuire *et al.* 2009, Cracraft 2013). The other major clades of hummingbirds include the mangoes (Polytminae), the coquettes and many others in Lesbiinae, and the mountain gems, emeralds, and bees, including the main North American radiation of hummingbirds, in Trochilinae (Dickinson & Remsen 2013, del Hoyo & Collar 2014). The Giant Hummingbird *Patagona gigas* does not belong to any of the larger clades and is designated its own subfamily, Patagoninae, sister to the Trochilinae (McGuire *et al.* 2007, McGuire *et al.* 2009).



Scintillant Hummingbird, *Selasphorus scintilla*. Volcán, Chiriquí Province, Panama. © Ian Davies.

Subfamily **FLORISUGINAE**

*TOPAZA*
2 species

*T. pella*
Crimson Topaz

*FLORISUGA*
2 species

*F. mellivora*
White-necked Jacobin

Subfamily **PHAETHORNITHINAE** (1 of 2)

*EUTOXERES*
2 species

*E. condamini*
Buff-tailed Sicklebill

*RAMPHODON*
1 species

*R. naevius*
Saw-billed Hermit

*GLAUCIS*
3 species



*G. dohrnii*
Hook-billed Hermit

*THRENETES*
3 species



*T. leucurus*
Pale-tailed Barbthroat

*ANOPETIA*
1 species



*A. gounellei*
Broad-tipped Hermit

*PHAETHORNIS*
29 species



*P. syrmatophorus*
Tawny-bellied Hermit

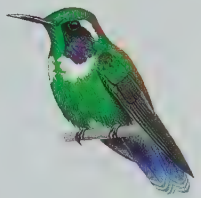
## Subfamily **POLYTMINAE**

*DORYFERA*
2 species



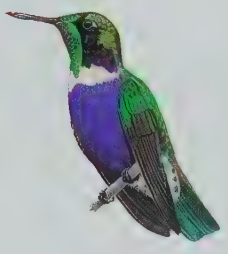
*D. ludovicae*
Green-fronted Lancebill

*SCHISTES*
2 species



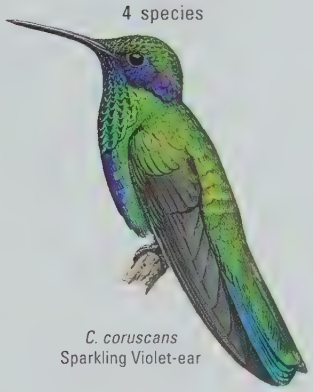
*S. geoffroyi*
Eastern Wedge-billed Hummingbird

*AUGASTES*
2 species



*A. scutatus*
Hyacinth Visorbearer

*COLIBRI*
4 species



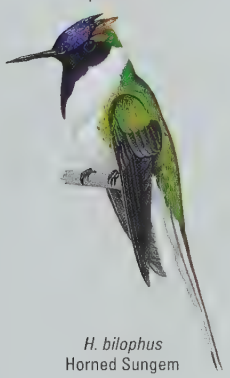
*C. coruscans*
Sparkling Violet-ear

*ANDRODON*
1 species



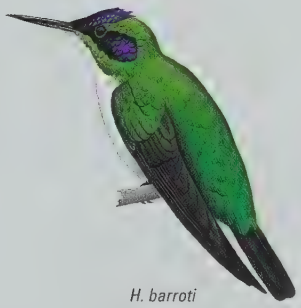
*A. aequatorialis*
Tooth-billed Hummingbird

*HELIACTIN*
1 species



*H. bilophus*
Horned Sungem

*HELIOTHRYX*
2 species



*H. barroti*
Purple-crowned Fairy

*POLYTMUS*
3 species



*P. guainumbi*
White-tailed Goldenthroat

*CHRYSOLAMPIS*
1 species



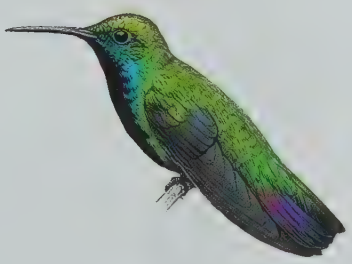
*C. mosquitus*
Ruby-topaz Hummingbird

*AVOCETTULA*
1 species



*A. recurvirostris*
Fiery-tailed Awlbill

*ANTHRACOTHORAX*
8 species



*A. nigricollis*
Black-throated Mango

*EULAMPIS*
2 species

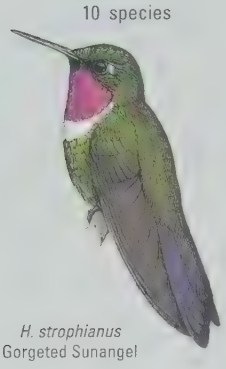


*E. jugularis*
Purple-throated Carib

Subfamily **LESBIINAE** (1 of 2)

Tribe **Lesbiini**

*HELIANGELUS*
10 species



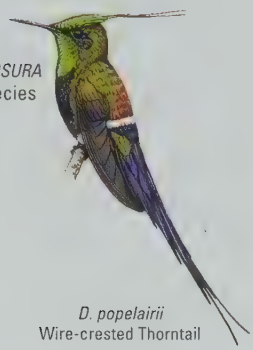
*H. strophianus*
Gorgeted Sunangel

*SEPHANOIDES*
2 species



*S. sephaniodes*
Green-backed Firecrown

*DISCOSURA*
5 species



*D. popelairii*
Wire-crested Thorntail

*LOPHORNIS*
11 species



*L. stictolophus*
Spangled Coquette

*PHLOGOPHILUS*
2 species



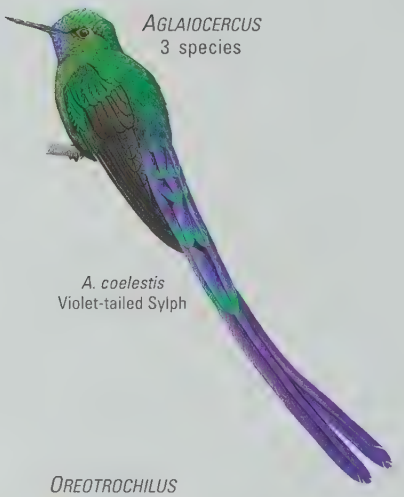
*P. hemileucurus*
Ecuadorian Piedtail

*ADELOMYIA*
1 species



*A. melanogenys*
Speckled Hummingbird

*AGLAIOCERCUS*
3 species



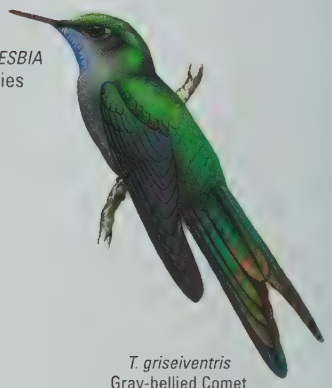
*A. coelestis*
Violet-tailed Sylph

*SAPPHO*
1 species



*S. sparganurus*
Red-tailed Comet

*TAPHROLESBIA*
1 species



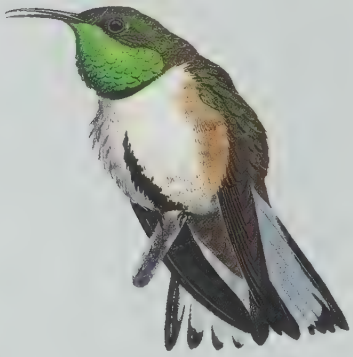
*T. griseiventris*
Gray-bellied Comet

*POLYONYMUS*
1 species



*P. caroli*
Bronze-tailed Comet

*OREOTROCHILUS*
6 species



*O. stolzmanni*
Green-headed Hillstar

*OPISTHOPRORA*
1 species



*O. euryptera*
Mountain Avocetbill

*LESBIA*
2 species



*L. victoriae*
Black-tailed Trainbearer

*RAMPHOMICRON*
2 species



*R. microrhynchum*
Purple-backed Thornbill

*CHALCOSTIGMA*
5 species



*C. herrani*
Rainbow-bearded Thornbill

*OXYPOGON*
4 species



*O. lindenii*
White-bearded Helmetcrest

*OREONYMPHA*
2 species



*O. albolimbata*
Western Mountaineer

*METALLURA*
9 species



*M. tyrianthina*
Tyrian Metaltail

## Subfamily **LESBIINAE** (2 of 2)
## Tribe **Heliantheini**

*HAPLOPHAEDIA*
3 species

*H. aureliae*
Greenish Puffleg

*ERIOCNEMIS*
12 species

*E. sapphiropygia*
Coppery-naped Puffleg

*LODDIGESIA*
1 species

*L. mirabilis*
Marvelous Spatuletail

*AGLAEACTIS*
4 species

*A. cupripennis*
Shining Sunbeam

*PTEROPHANES*
1 species

*P. cyanopterus*
Great Sapphirewing

*COELIGENA*
19 species

*C. torquata*
Collared Inca

*LAFRESNAYA*
1 species

*L. lafresnayi*
Mountain Velvetbreast

*ENSIFERA*
1 species

*E. ensifera*
Sword-billed Hummingbird

*BOISSONNEAUA*
3 species

*B. jardini*
Velvet-purple Coronet

*OCREATUS*
1 species

*O. underwoodii*
Booted Racket-tail

*UROCHROA*
2 species

*U. bougueri*
Rufous-gaped Hillstar

*UROSTICTE*
2 species

*U. benjamini*
Purple-bibbed Whitetip

## Subfamily **PATAGONINAE**

*PATAGONA*
1 species

*P. gigas*
Giant Hummingbird

*HELIODOXA*
10 species

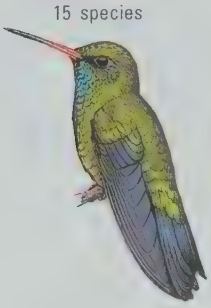
*H. imperatrix*
Empress Brilliant

*CLYTOLAEMA*
1 species

*C. rubricauda*
Brazilian Ruby

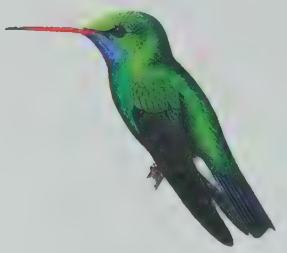
Subfamily **TROCHILINAE** (1 of 3)
Tribe **Trochilini** (1 of 2)

*CHLOROSTILBON*
15 species



*C. lucidus*
Glittering-bellied Emerald

*CYNANTHUS*
4 species



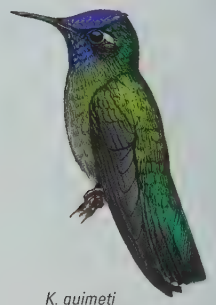
*C. latirostris*
Broad-billed Hummingbird

*CYANOPHAIA*
1 species



*C. bicolor*
Blue-headed Hummingbird

*KLAIS*
1 species



*K. guimeti*
Violet-headed Hummingbird

*ABEILLIA*
1 species



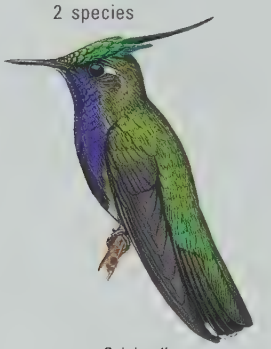
*A. abeillei*
Emerald-chinned Hummingbird

*ORTHORHYNCUS*
1 species



*O. cristatus*
Antillean Crested Hummingbird

*STEPHANOXIS*
2 species



*S. lalandi*
Green-crowned Plovercrest

*APHANTOCHROA*
1 species



*A. cirrochloris*
Sombre Hummingbird

*ANTHOCEPHALA*
1 species



*A. floriceps*
Blossomcrown

*CAMPYLOPTERUS*
11 species



*C. hemileucurus*
Violet Sabrewing

*EUPETOMENA*
1 species



*E. macroura*
Swallow-tailed Hummingbird

*EUPHERUSA*
4 species



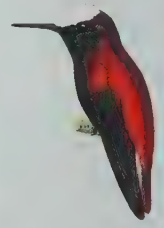
*E. eximia*
Stripe-tailed Hummingbird

*ELVIRA*
2 species



*E. cupreiceps*
Coppery-headed Emerald

*MICROCHERA*
1 species



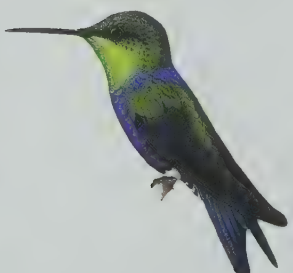
*M. albocoronata*
Snowcap

*CHALYBURA*
2 species



*C. buffonii*
White-vented Plumeleteer

*THALURANIA*
5 species



*T. furcata*
Fork-tailed Woodnymph

*TAPHROSPILUS*
1 species



*T. hypostictus*
Many-spotted Hummingbird

*LEUCOCHLORIS*
1 species



*L. albicollis*
White-throated Hummingbird

*LEUCIPPUS*
4 species



*L. fallax*
Buffy Hummingbird

*Trochilus*
2 species

*T. polytmus*
Red-billed Streamertail

*Amazilia*
35 species

*A. amazilia*
Amazilia Hummingbird

*Chrysuronia*
1 species

*C. oenone*
Golden-tailed Sapphire

*Goethalsia*
1 species

*G. bella*
Pirre Hummingbird

*Goldmania*
1 species

*G. violiceps*
Violet-capped Hummingbird

*Lepidopyga*
3 species

*L. coeruleogularis*
Sapphire-throated Hummingbird

*Juliamyia*
1 species

*J. julie*
Violet-bellied Hummingbird

*Hylocharis*
3 species

*H. cyanus*
White-chinned Sapphire

*Basilinna*
2 species

*B. leucotis*
White-eared Hummingbird

## Tribe **Lampornithini**

*Sternoclyta*
1 species

*S. cyanopectus*
Violet-chested Hummingbird

*Hylonympha*
1 species

*H. macrocerca*
Scissor-tailed Hummingbird

*Eugenes*
1 species

*E. fulgens*
Magnificent Hummingbird

*Panterpe*
1 species

*P. insignis*
Fiery-throated Hummingbird

*Heliomaster*
4 species

*H. furcifer*
Blue-tufted Starthroat

*Lampornis*
8 species

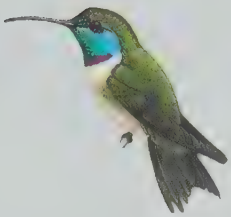
*L. calolaemus*
Purple-throated Mountain-gem

*Lamprolaima*
1 species

*L. rhami*
Garnet-throated Hummingbird

Subfamily **TROCHILINAE** (3 of 3)
Tribe **Mellisugini**

*MYRTIS*
1 species



*M. fanny*
Purple-collared Woodstar

*EULIDIA*
1 species



*E. yarrellii*
Chilean Woodstar

*RHODOPIS*
1 species



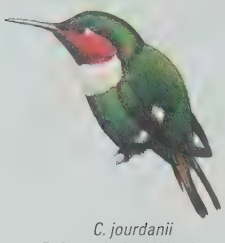
*R. vesper*
Oasis Hummingbird

*THAUMASTURA*
1 species



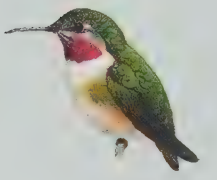
*T. cora*
Peruvian Sheartail

*CHAETOCERCUS*
6 species



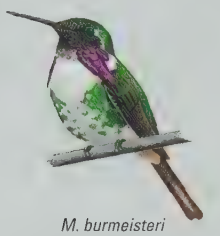
*C. jourdanii*
Rufous-shafted Woodstar

*MYRMIA*
1 species



*M. micrura*
Short-tailed Woodstar

*MICROSTILBON*
1 species



*M. burmeisteri*
Slender-tailed Woodstar

*CALLIPHLOX*
4 species



*C. bryantae*
Magenta-throated Woodstar

*DORICHA*
2 species



*D. enicura*
Slender Sheartail

*TILMATURA*
1 species



*T. dupontii*
Sparkling-tailed Woodstar

*CALOTHORAX*
2 species



*C. lucifer*
Lucifer Hummingbird

*MELLISUGA*
2 species



*M. helenae*
Bee Hummingbird

*CALYPTE*
2 species



*C. anna*
Anna's Hummingbird

*ARCHILOCHUS*
2 species



*A. colubris*
Ruby-throated Hummingbird

*SELASPHORUS*
7 species



*S. rufus*
Rufous Hummingbird

*ATTHIS*
2 species



*A. heloisa*
Bumblebee Hummingbird

# Order: CUCULIFORMES

## CUCULIDAE
Cuckoos

36 genera • 149 species

**Related Families** Otididae (bustards), Musophagidae (turacos), all families in Gruiformes

**Similar Birds** Cuckoo-shrikes (Campephagidae), babblers (Timaliidae), jays (Corvidae), drongos (Dicruridae)

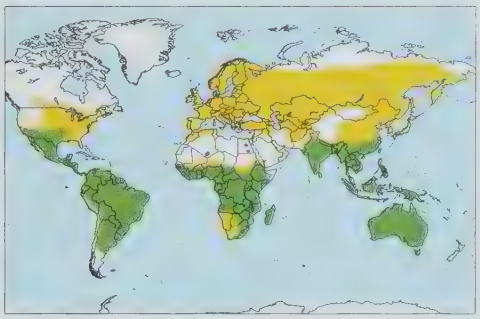
**Description**
- Plumage often with brown, gray, or white, though some Asian species with blue; some much more colorful, with iridescent green or gold
- Wings usually short, slightly pointed; tail often long, graduated, and rounded, sometimes with distinctive patterns beneath
- Body small to medium, long-ovoid
- Bill medium length, decurved and stout to fine
- Head small; neck short, often giving a "hunched" appearance; bare orbital skin (sometimes brightly colored) and on a few species, crests or plumes adorning face
- Legs short, with zygodactyl feet
- Sexes generally similar; males sometimes larger than females; *Chrysococcyx* and *Cuculus* cuckoos sexually dichromatic with males having less brown in plumage

**Habitat** Most cuckoos inhabit forested and woodland habitats, though some species prefer open savanna and arid scrubland.



Chestnut-bellied Malkoha, *Phaenicophaeus sumatranus*. Mandai Orchid Garden, Singapore. © Con Foley.





**Food** Most cuckoos feed primarily on insects, many preferring caterpillars, and some of the larger species prefer small vertebrates whereas others feed primarily on fruit.

**Breeding** Cuculidae boasts a wide variety of breeding strategies, from brood parasitism to cooperative breeding and from monogamy to polyandry. Eggs of many brood-parasitic species mimic the eggs of their hosts, and some species can parasitize a remarkable array of egg types. This is accomplished by individual females laying eggs of only a single type and parasitizing the appropriate host, usually the same species of host that raised the female. In some brood-parasitizing species, the young, upon hatching, may physically eject the eggs of the host from the nest. Among obligate brood parasites, there is remarkably little known about the mating system. Despite the lack of any parental duties, it appears that most species are mostly monogamous, with a bit of both polyandry and polygyny in different systems. Among the species that care for their own young, some are monogamous with biparental care, some are polyandrous with male care only, and many are cooperative breeders, with up to five mated pairs of birds defending a single territory and all the females of the breeding group laying their eggs in a single nest and cooperating in caring for the offspring. The

Although Cuculidae includes some of the most social birds, the group-living anis, it is perhaps best known for its particularly antisocial members, the brood-parasitic cuckoos that abdicate parental duties by laying their eggs in the nests of other species. Brood parasitism evolved independently at least three times in this family and many species are brood parasites. Cuckoos parasitize an astounding variety of hosts worldwide, and many species lay eggs that mimic the eggs of their host. Largely forest birds, the adults are often hard to see and are detected only by their species-distinctive, simple, whistled calls. A few, however, such as roadrunners and guiras, can be seen darting about open habitats or perched on fence posts.

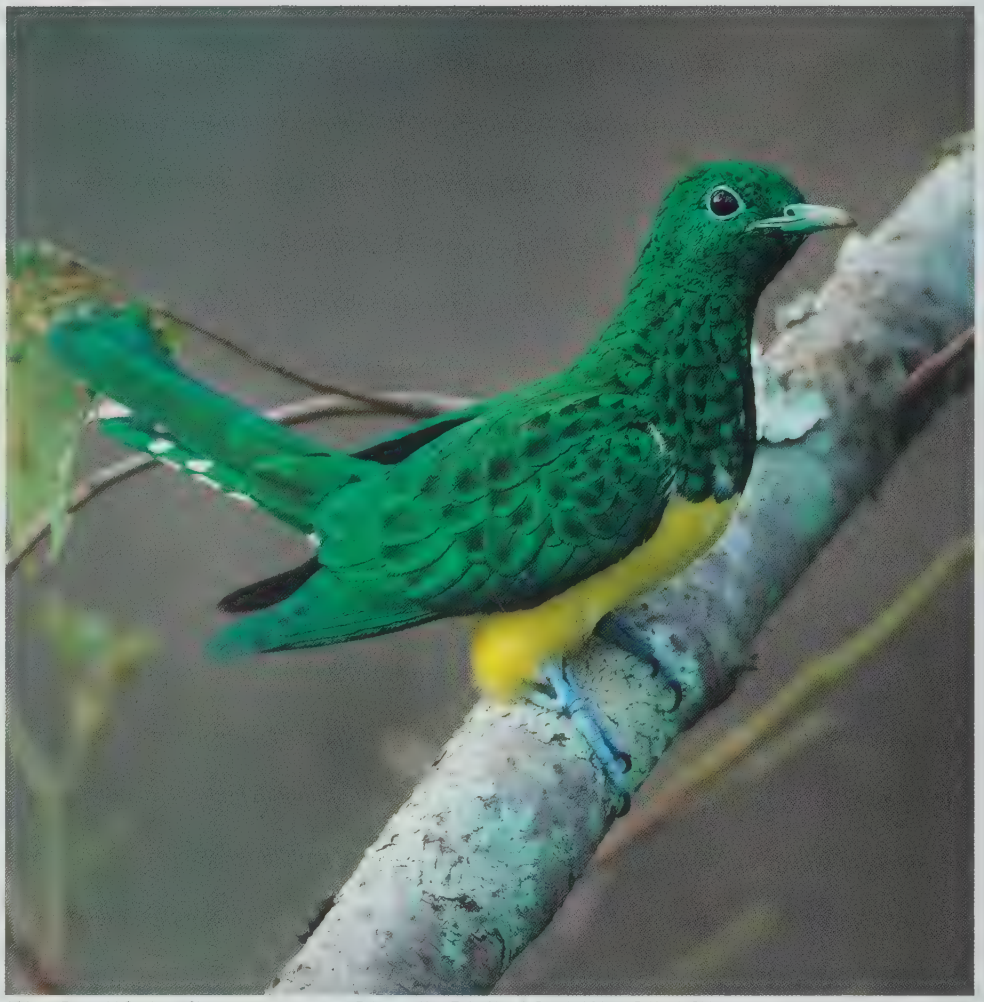


Fan-Tailed Cuckoo, *Cacomantis flabelliformis*. Sundown NP, Queensland, Australia. © Graeme Chapman.

cuckoos that raise their young have a variety of nest styles, from dome-shaped nests of dried grass, with a side entrance, to relatively shallow, bowl-shaped nests made of sticks. Parental species generally lay 1 to 5 eggs, but clutches can climb to 20 eggs when several females lay in a common nest. In the socially monogamous species, as well as the cooperative breeding species, both sexes participate in all aspects of parental care, from incubation to feeding young. The growth rates of cuckoo chicks are high, with rapid development and short nestling periods for both brood-parasitic and parental species.

**Conservation** Many cuculid species, particularly those in Southeast Asia, are threatened with continued habitat destruction and degradation. Other threats include opportunistic hunting of cuckoos for food, the introduction of competitors, and predation by non-native mammalian predators. About 13% of cuckoo species are at risk (10 NT, 6 VU, 2 EN, 2 CR); one, the snail-eating *Coua delalandei*, probably went extinct in the mid-19th century, and the two critically endangered species both have limited ranges and populations.

**Relationships** Cuculidae is the sole family in Cuculiformes. Early morphological work suggested that Cuculidae was allied with Musophagidae or Opisthocomidae. Recent molecular phylogenies indicate instead that Cuculiformes may be sister to Gruiformes, with that clade being sister to Otidiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008), or that Cuculiformes may be sister to a clade containing both Otidiformes and Musophagiformes (Jarvis *et al.* 2014). For relationships among the clades within Cuculidae, see the phylogenies and groupings in Sorenson & Payne 2005.



African Emerald Cuckoo, *Chrysococcyx cupreus*. Eshowe, KwaZulu-Natal, South Africa. © Hugh Chittenden.

Subfamily **CROTOPHAGINAE**

Tribe **Crotophagini**

*CROTOPHAGA*
3 species

*C. ani*
Smooth-billed Ani

*GUIRA*
1 species

*G. guira*
Guira Cuckoo

*MOROCOCCYX*
1 species

*M. erythropygus*
Lesser Ground-cuckoo

*GEOCOCCYX*
2 species

*G. californianus*
Greater Roadrunner

Tribe **Neomorphini**

*TAPERA*
1 species

*T. naevia*
Striped Cuckoo

*DROMOCOCCYX*
2 species

*D. phasianellus*
Pheasant Cuckoo

*NEOMORPHUS*
4 species

*N. geoffroyi*
Rufous-vented Ground-cuckoo

## Subfamily **Centropodinae**

### Tribe **Couini**

*Coua*
11 species

*C. cristata*
Crested Coua

*Carpococcyx*
3 species

*C. renauldi*
Coral-billed Ground-cuckoo

### Tribe **Centropodini**

*Centropus*
28 species

*C. sinensis*
Greater Coucal

## Subfamily **Cuculinae** (1 of 2)

### Tribe **Phaenicophaeini**

*Rhinortha*
1 species

*R. chlorophaea*
Raffles's Malkoha

*Ceuthmochares*
2 species

*C. aereus*
Chattering Yellowbill

*Taccocua*
1 species

*T. leschenaultii*
Sirkeer Malkoha

*Zanclostomus*
1 species

*Z. javanicus*
Red-billed Malkoha

*Phaenicophaeus*
7 species

*P. curvirostris*
Chestnut-breasted Malkoha

*Dasylophus*
1 species

*D. superciliosus*
Red-crested Malkoha

*Rhamphococcyx*
1 species

*R. calyorhynchus*
Yellow-billed Malkoha

*Lepidogrammus*
1 species

*L. cumingi*
Scale-feathered Malkoha

*Clamator*
4 species

*C. coromandus*
Chestnut-winged Cuckoo

*Piaya*
3 species

*P. cayana*
Common Squirrel-cuckoo

*Coccycua*
3 species

*C. minuta*
Little Cuckoo

*Coccyzus*
14 species

*C. americanus*
Yellow-billed Cuckoo

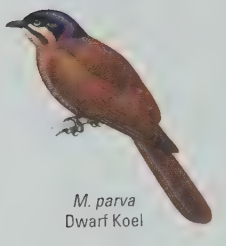
Subfamily **Cuculinae** (2 of 2)
Tribe **Cuculini**

*Pachycoccyx*
1 species



*P. audeberti*
Thick-billed Cuckoo

*Microdynamis*
1 species



*M. parva*
Dwarf Koel

*Eudynamys*
2 species



*E. scolopaceus*
Western Koel

*Urodynamis*
1 species



*U. taitensis*
Long-tailed Koel

*Scythrops*
1 species



*S. novaehollandiae*
Channel-billed Cuckoo

*Chalcites*
8 species



*C. minutillus*
Little Bronze-cuckoo

*Chrysococcyx*
6 species



*C. cupreus*
African Emerald Cuckoo

*Cacomantis*
7 species



*C. merulinus*
Plaintive Cuckoo

*Heteroscenes*
1 species



*H. pallidus*
Pallid Cuckoo

*Caliechthrus*
1 species



*C. leucolophus*
White-crowned Cuckoo

*Cercococcyx*
3 species



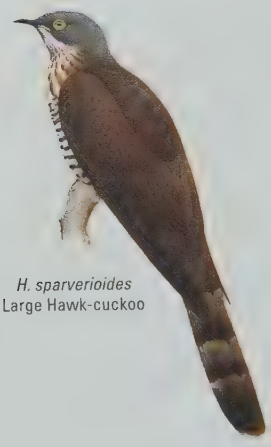
*C. olivinus*
Olive Long-tailed Cuckoo

*Surniculus*
4 species



*S. dicruroides*
Fork-tailed Drongo-cuckoo

*Hierococcyx*
8 species



*H. sparverioides*
Large Hawk-cuckoo

*Cuculus*
10 species



*C. canorus*
Common Cuckoo

# Order: MUSOPHAGIFORMES

## MUSOPHAGIDAE
Turacos

7 genera • 24 species

**Related Families** Most likely those in the large waterbird assemblage (Procellariiformes, Ciconiiformes, Pelecaniformes, and Suliformes), Cuculidae (cuckoos), or Opisthocomidae (Hoatzin)

**Similar Birds** Hoatzin (Opisthocomidae), chachalacas (Cracidae)

**Description**
- Plumage varies from gray and white to brightly colored greens and deep blues, sometimes with red highlights, especially in the wings
- Wings short, rounded; tail long, broad
- Body medium to large, cylindrical ovoid
- Bill serrate, deep, broad, sometimes expanded to form frontal shield, often brightly colored
- Head phasianid-like, crested; neck thick, sturdy
- Legs thick; feet zygodactyl, toes short with fourth reversible
- Sexes similar

**Habitat** Turacos inhabit forests, woodlands, and savannas of sub-Saharan Africa, from very mesic to quite arid.



White-bellied Go-away-bird, *Criniferoides leucogaster*. Dawa River, Ethiopia. © Luke Seitz.



**Food** Fruit is the most important part of the diet of most turacos, and some species are strictly frugivorous. Other species supplement their diet to varying degrees with leaves, flowers, and buds, and some will also take caterpillars, termites, and other insects during the breeding season.

**Breeding** Turacos are monogamous, and some species breed cooperatively as well. Turaco nests are simple structures, being a flat nest built of sticks placed in a tree or bush. Females lay 2 or occasionally 3 eggs. Both male and female share incubation and chick-rearing duties. Incubation takes 16 to 31 days, and the hatchlings are fed in the nest by regurgitations from the parents for about two to three weeks, and they then climb from the nest. They are still fed by the parents for some time after the chicks can first fly at about four to five weeks of age.

**Conservation** Continuing habitat destruction and habitat fragmentation, mostly deforestation for timber or agricultural conversion, is responsible for declines in three species (13%) of turacos (1 NT, 1 VU, 1 EN). Some species are also hunted for their feathers and meat, and others are captured for the pet trade.

**Relationships** Musophagidae is the sole family in Musophagiformes. Previously, on morpho-

The turacos include some of the most intensely and interestingly colored birds, whose feathers contain a distinctive set of pigments known in no other birds. All species have crests, often in contrasting colors. Tantalizingly, it seems that the more outlandishly colored they are, the harder they are to see. Even though many species are noisy or gregarious, only the gray go-away-birds (named for their loud alarm calls) are really conspicuous and commonly seen. With long tails and rounded wings, turacos most often run through the branches rather than fly. Their diets are dominated by fruit, though, despite their Latin name, they are not, in fact, known to eat bananas.



Fischer's Turaco, *Tauraco fischeri*. Arabuko-Sokoke Forest Reserve, Taita-Taveta County, Kenya. © Nick Athanas.

logical grounds, the turacos were usually linked with Cuculiformes, or placed as sister to the enigmatic Hoatzin within an expanded Cuculiformes (Cracraft 1981, Hughes & Baker 1999, Livezey & Zusi 2007). Recent genetic work has still not fully resolved the relationships of the turacos with other birds. For example, Hackett *et al.* (2008) suggested it may be closely related to the large waterbird clade that includes Procellariiformes, Suliformes, Pelecaniformes, and Ciconiiformes. Another study, which had less resolution, recovered a polytomy with Gruiformes (Ericson *et al.* 2006a). A more recent study using genome-wide sequence data found support for a clade that included Musophagidae, Cuculidae, and Otididae (Jarvis *et al.* 2014), in which the turacos were sister to bustards. Because of the relatively low support for this relationship, the long branch length associated with any turaco relationship, and the inconsistent results among studies, we have chosen to keep the turacos in their own order, Musophagiformes, with a large list of (distantly) related families. Within Musophagidae, Corythaeolinae is likely sister to the clade made up of Criniferinae and Musophaginae (Veron & Winney 2000).



Purple-crested Turaco, *Gallirex porphyreolophus*. Eshowe, KwaZulu-Natal, South Africa. © Hugh Chittenden.

Subfamily **CORYTHAEOLINAE**

*CORYTHAEOLA*
1 species

*C. cristata*
Great Blue Turaco

*CRINIFEROIDES*
1 species

*C. leucogaster*
White-bellied Go-away-bird

*GALLIREX*
2 species

*G. porphyreolophus*
Purple-crested Turaco

Subfamily **CRINIFERINAE**

*CRINIFER*
2 species

*C. piscator*
Western Plantain-eater

*CORYTHAIXOIDES*
3 species

*C. leopoldi*
Black-faced Go-away-bird

Subfamily **MUSOPHAGINAE**

*TAURACO*
13 species

*T. schalowi*
Schalow's Turaco

*MUSOPHAGA*
2 species

*M. rossae*
Ross's Turaco

# Order: OTIDIFORMES

## OTIDIDAE
Bustards

12 genera • 26 species

**Related Families** Cuculidae (cuckoos), Gruidae (cranes), Musophagidae (turacos)

**Similar Birds** Seriemas (Cariamidae), Secretarybird (Sagittariidae), megapodes (Megapodiidae), tinamous (Tinamidae), thick-knees (Burhinidae)

**Description**
- Plumage usually in grays, black, and browns, often lighter below and with cryptic patterns
- Wings broad; tail short and rounded
- Body medium to large, ovoid
- Bill short, stout, and straight
- Head small; neck long
- Legs long and strong, with reticulate scalation all around the leg; no wide scutes in front; three toes, very short, broad
- Sexes similar; males larger than females

**Habitat** Bustards inhabit open areas, ranging from grasslands and plains to savanna to semi-arid desert.

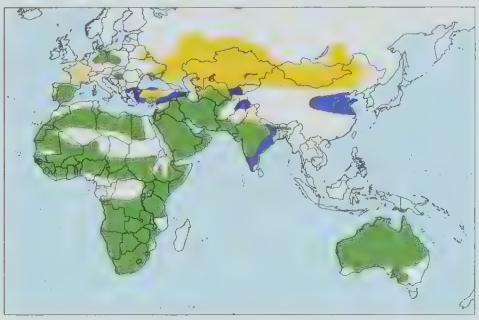
**Food** Bustards eat a variety of plant matter, including fruit, seeds, leaves, and shoots as well as a great number of insects and even small vertebrates.

**Breeding** Bustards are shy, and many live in inaccessible places; thus the details of their breeding biology are very poorly known. Most species appear to be polygynous with females choosing from among a number of males displaying on individual territories at the same time, an "exploded lek." Once they make their mating choice, females in most species likely take on all remaining reproductive duties. It appears, however, that a few species may be monogamous, and males apparently help with parental duties in those species, even sometimes with an immature male from a previous breeding season staying with his parents to help. In any event, each species has distinctive, and often spectacular, mating displays. Bustards nest on the ground, and in most species only a shallow scrape or scant grass marks the nest site. Females lay 2 to 5 eggs, though clutches of 2 or 3 eggs are by far the most common. Incubation takes 20 to 25 days. The precocial young hatch asynchronously, and a day or so after the last chick has hatched they leave the nest with a parent. The chicks are shown food but feed themselves from the start, and they are brooded at night at first. They can fly when they are about half-adult size at about four to five weeks of age, but probably do not become independent until several months later.



Red-crested Korhaan, *Lophotis ruficrista*. Kruger NP, South Africa. © Con Foley.





With long legs, distinctively scaled in a net pattern, and very short toes, the bustards are mid-sized to large ground birds of open country. Although they are found throughout Eurasia, their diversity reaches its peak in sub-Saharan Africa. The larger species seem almost like small ratites as they walk and forage with repeated quick thrusts of their beak to the ground. The family includes the heaviest flying birds, the Great and Kori Bustards, and most species have extraordinary courtship displays. Combining bizarre contortions of the plumage with vertical hops, short flights, bowing, or head-bobbing, their courtship behavior transforms them into outlandish and manifestly non-bird-like forms.



Kori Bustard, *Ardeotis kori*. Ngorongoro Conservation Area, Tanzania. © Piotr Jonczyk.

**Conservation** Many species (58%) of bustards are declining as a result of hunting and habitat loss, as natural grassland habitats in Africa and Eurasia are converted for use as pastureland and other agricultural purposes (7 NT, 4 VU, 2 EN, 2 CR). Despite these declines, some bustards have received attention from many conservation groups, and reintroduction efforts in several species may be helping to reverse, or at least slow, declines.

**Relationships** The affinities of the bustards have long been a taxonomic challenge, although they have been placed traditionally in the Gruiformes (Cracraft 1981). More recent molecular phylogenetic analyses suggest that the bustards fall well outside of the Gruiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008, Jarvis *et al.* 2014). The phylogenetic distinctness of Otididae clearly merits an order of its own, but it is unclear whether Otididae is sister to the clade made up of Gruiformes plus Cuculiformes (Hackett *et al.* 2008) or whether it is sister to Musophagidae, and together they would then be sister to the Cuculidae (Jarvis *et al.* 2014).


Otis
1 species
Tetrax
1 species
Chlamydotis
2 species
Lissotis
2 species
T. tetrax
Little Bustard
O. tarda
Great Bustard
C. macqueenii
Asian Houbara
L. melanogaster
Black-bellied Bustard
Neotis
4 species
Ardeotis
4 species
N. denhami
Denham's Bustard
A. nigriceps
Great Indian Bustard
Houbaropsis
1 species
Sypheotides
1 species
H. bengalensis
Bengal Florican
S. indicus
Lesser Florican
Lophotis
3 species
Heterotetrax
3 species
Afrotis
2 species
Eupodotis
2 species
L. savilei
Savile's Bustard
H. rueppelii
Rüppell's Bustard
A. afra
Southern Black Bustard
E. senegalensis
White-bellied Bustard

# Order: OPISTHOCOMIFORMES

## OPISTHOCOMIDAE
Hoatzin

1 genus • 1 species

**Related Families** Affinities very poorly understood, but perhaps closest to Gruiformes or Charadriiformes

**Similar Birds** Turacos (Musophagidae), anis (Cuculidae), guans (Cracidae), pheasants (Phasianidae)

**Description**
- Plumage shaggy; brown above, with cream streaking, and beige below with rufous underwings and undertail coverts
- Wings and tail are long and rounded; young with clawed manus at hatching
- Body medium-sized, ovoid
- Bill short, deep, and laterally compressed
- Face bare, blue-skinned, capped with a long shaggy crest; neck long
- Legs short; feet anisodactyl, with medium-short toes having long claws
- Sexes similar



Hoatzin, *Opisthocomus hoazin*.
Manu NP, Peru. © Francesco Veronesi.





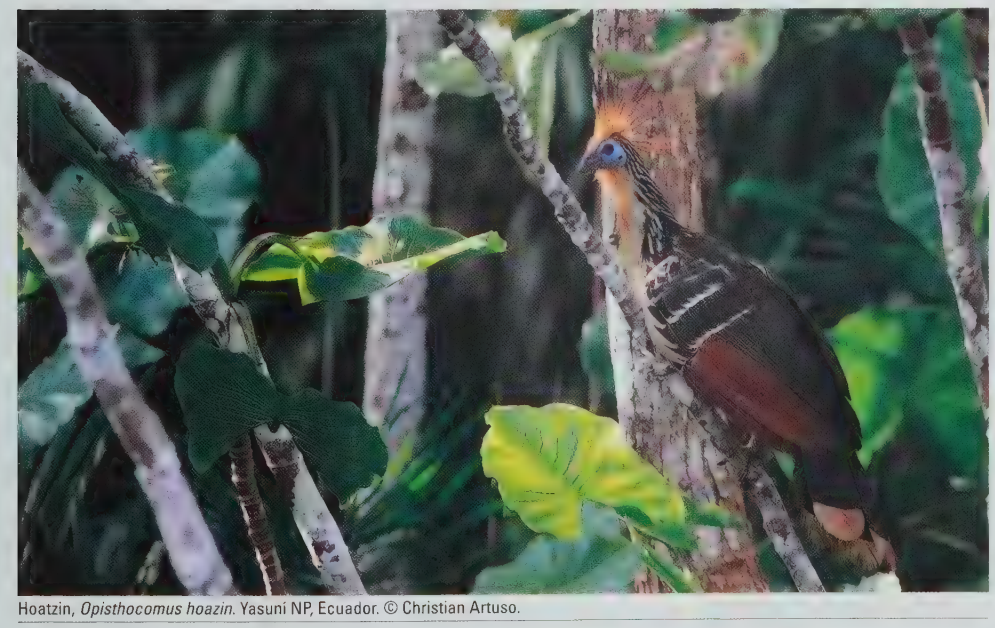
**Habitat** Hoatzins live in tropical lowland forests, usually in riparian forest in the Amazon and Orinoco River basins, where they nest in trees that overhang the water.

**Food** As a folivore that eats leaves almost exclusively, the Hoatzin is unique among birds. It is also the only bird to have foregut fermentation, in an enlarged crop, to aid in the digestion of plant material. Some of the gut bacteria are those found in ruminant mammals, but a number of them are unique, perhaps because birds have a higher internal body temperature (Godoy-Vitorino *et al.* 2008).

**Breeding** Hoatzins are cooperative breeders, with a pair having up to six helpers in the group, though more than three is rare; helpers aid in all aspects of breeding, from nest-building through incubation and chick rearing. Hoatzins build simple platform nests of sticks in low trees and shrubs that overhang the water. The typical clutch size is 2 in Opisthocomidae, but females can lay as many as 3 eggs. Both adults, with their helpers, care for the chicks and help in nest construction and incubation, which takes one month. Adult birds feed chicks regurgitated plant material for up to two months after hatching.

**Conservation** There are no conservation concerns for Hoatzins, as they have a relatively large range and stable population trends.

**Relationships** The relationships of the Hoatzin have long been—and remain—one of the greatest mysteries in all of avian systematics. It has most often been allied with Galliformes owing to its outwardly pheasant-like appearance and several osteological characters (Cracraft 1981, Hughes & Baker 1999, Sorenson *et al.* 2003), but other studies have suggested affinities to Cuculiformes (Sibley & Ahlquist 1990, Hedges *et al.* 1995), Musophagiformes (Hughes & Baker 1999), or Columbiformes (Sorenson *et al.* 2003). The most recent broad surveys of avian relationships suggest that the Hoatzin has no close living relatives, although fossil evidence suggests that members of Opisthocomiformes were once found in Africa, and possibly dispersed across the Atlantic by rafting on vegetative material (Mayr *et al.* 2011). The confusing traits of this unique bird reflect its long history as an independently evolving lineage (Ericson *et al.* 2006a); phylogenies using DNA sequence data suggest, alternatively, that the Hoatzin is part of the "metaves", with the Columbiformes, Pteroclidiformes, and Podicipediformes (Ericson *et al.* 2006a); that its closest affinities are to a huge clade including Pelecaniformes, Procellariiformes, Musophagiformes, Cuculiformes, and Otidiformes (Hackett *et al.* 2008); or that it is allied with the Gruiformes and Charadriiformes (Jarvis *et al.* 2014).



Hoatzin, *Opisthocomus hoazin*. Yasuní NP, Ecuador. © Christian Artuso.

These exotic-looking birds have the bill of a chicken, the proportions of a turaco, and a scruffy version of a hoopoe's crest. Hoatzins nest in shrubs over still waters in northern South America. The young chicks are competent swimmers, and if they fall from the nest they are also quite capable of climbing back up, aided by two functional claws on the digits of each wing, which disappear as the wing develops. Hoatzins have a rumen-like crop where their unusual diet of mostly leaves is broken down. This process takes time, so these odd birds spend much of the day almost motionless, leaning on branches and emitting manure-like smells that have led to their local name, "stink-birds."

*OPISTHOCOMUS*
1 species



*O. hoazin*
Hoatzin

# Order: GRUIFORMES

## Families: Heliornithidae, Sarothruridae, Rallidae, Psophiidae, Aramidae, Gruidae

Gruiformes has long been a "trash-bin" order, where families with unclear or questionable affinities have been placed when no other placement seems appropriate. In addition to five of the six families that we currently recognize as being part of Gruiformes, six other families (Cariamidae, Mesitornithidae, Rhynochetidae, Eurypygidae, Otididae, and Turnicidae) have often been included in the order.

Use of morphological data has not always recovered this larger Gruiformes as a monophyletic order. Cracraft (1981) suggested that the order was cohesive, based on several morphological characters, although he admitted that three families, Otididae, Mesitornithidae, and Turnicidae, were difficult to place. Livezey and Zusi (2007) proposed a different hypothesis for the relationships of this group, and did not recover a monophyletic Gruiformes. Instead, they found evidence for three orders, what they called Gruiformes, Ralliformes, and Turniciformes, all three of which together formed a monophyletic clade with the Charadriiformes.

Recent studies using DNA sequence data support the view that the traditional Gruiformes is not valid; in these studies, only the rails, finfoots, trumpeters, cranes, and Limpkin group together (Fain *et al.* 2007, Hackett *et al.* 2008). Within this newly limited Gruiformes, a group of small rail-like birds, the flufftails, are now clearly more closely allied with the finfoots than they are with the rails (Garcia-R *et al.* 2014), and we follow that source in recognizing a separate family, Sarothruridae, to accommodate these birds. Sarothruridae is sister to Heliornithidae, and these two together are sister to Rallidae. These three families are in turn sister to the other three families, among which Gruidae is sister to Aramidae, and these taken together are sister to Psophiidae (Fain *et al.* 2007, Hackett *et al.* 2008, Garcia-R *et al.* 2014).

This more restricted Gruiformes appears to be sister either to Cuculiformes (Hackett *et al.* 2008) or to Charadriiformes (Jarvis *et al.* 2014). Clearly these relationships between Gruiformes and other orders are not yet robustly resolved, and more data and further analyses will likely help clarify this long-standing conundrum in the future.



Black-tailed Native-hen, *Tribonyx ventralis*. Bowra Station, Cunnamulla, Queensland, Australia. © Drew Fulton.

Gruiformes

# HELIORNITHIDAE
## Sungrebe and Finfoots

3 genera • 3 species

**Related Families** Sarothruridae (flufftails and African woodrails), Rallidae (rails)

**Similar Birds** Grebes (Podicipedidae), coots and gallinules (Rallidae), ducks (Anatidae)

**Description**
- Plumage generally brown with distinct, bold black patterns
- Wings short and rounded; tail long, especially in *Podica*, and graduated
- Body small to medium, cylindrical fusiform
- Bill medium length, strong, tapered, and brightly colored
- Head small; neck long
- Legs very short; toes broadly lobed and often brightly colored
- Males larger than females; female Sungrebes more colorful than males

**Habitat** Heliornithids inhabit a variety of heavily vegetated waterways in the tropics, from streams to coastal lagoons. Appropriate cover along the water's edge includes mangroves, reeds, grasses, bushes, and dense rainforest.

**Food** Information on diets of finfoots is largely anecdotal, but their prey appear to include insects, mollusks, crustaceans, and small vertebrates as well as small amounts of seeds and leaves.

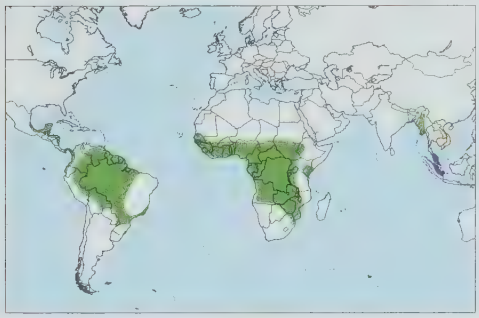
**Breeding** Heliornithids are presumed to be monogamous with biparental care, but much remains unknown about their breeding habits. Their nests consist of a shallow bowl of twigs, sticks, and reeds that is built in a low tree or bush overhanging the water. African Finfoots *Podica senegalensis* and Sungrebes *Heliornis fulica* typically have small clutches of 1 to 3 eggs; however, the Masked Finfoot *Heliopais personatus* has a clutch of 5 to 7 eggs. Both the male and female Sungrebe participate in nest construction and incubation. The smallest member of this family, it alone has young that hatch near naked, after a very short incubation period of 10 to 11 days. In *Podica*, only the female incubates (for at least 12 days), although it is presumed that both male and female care for the chicks after hatching. Chicks of both finfoot species are precocial, and can leave the nest and swim a few days after hatching.

**Conservation** Habitat loss from dams and logging has fragmented the small range of the



Sungrebe, *Heliornis fulica*.
Río Avisado Ecological Reserve, Tingana, Peru. © Christian Artuso.





Generally solitary birds of tropical fresh waters with vegetation cover, finfoots can be seen riding low in the water, with their long graduated tail spread on the water's surface. Yet they are quite comfortable on land, retreating from aquatic threats by climbing up into overhanging branches and roots. If pressed, they can also escape by flying away fast and low. Unlike any other bird, the male Sungrebe *Heliornis fulica* apparently has a fold of skin beneath each wing; each fold can hold one of the two chicks, and, if acute danger threatens, the male can fly away with the chicks safely tucked on board. Imagine what other oddities await as we get to know these shy birds better.



Masked Finfoot, *Heliopais personatus*. Mandai Lake, Singapore. © Con Foley.

Masked Finfoot, and its small population is continuing to decline as a result of hunting and egg collection (1 EN). It is the only heliornithid at risk (33%).

Relationships Heliornithidae is included in the restricted Gruiformes that we recognize here, and it is sister to Sarothruridae (Garcia-R *et al.* 2014), with which it forms a clade that is sister to Rallidae (Cracraft 1981, Houde 1994, Livezey & Zusi 2007, Hackett *et al.* 2008). An earlier hypothesis grouped Heliornithidae with Aramidae, but this relationship has not been supported in recent morphological or genetic studies. Instead, the finfoot/rail group is likely sister to the remaining Gruiformes (Ericson *et al.* 2006a, Fain *et al.* 2007, Hackett *et al.* 2008). Within this family, *Heliornis* and *Heliopais* are sister taxa, and these together are sister to *Podica* (Houde 1994, Fain *et al.* 2007).



African Finfoot, *Podica senegalensis*. Zambezi River, Victoria Falls, Zimbabwe. © Kevin Schafer.



Sungrebe, *Heliornis fulica*. Pousada Rio Claro, Matto Grosso, Brazil. © D. W. Winkler.



Gruiformes

## SAROTHRURIDAE
### Flufftails and African Woodrails

3 genera • 12 species

**Related Families** Heliornithidae (Sungrebe and finfoots), Rallidae (rails)

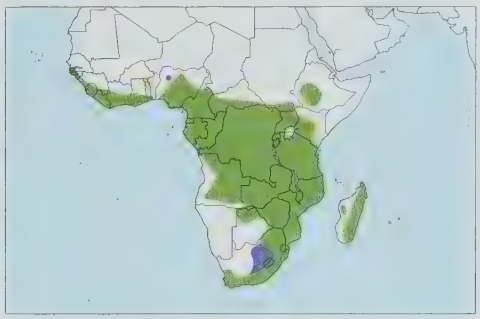
**Similar Birds** Rails (Rallidae), quails (Phasianidae and Odontophoridae), Ocellated Tapaculo (Rhinocryptidae)

**Description**
- *Sarothrura* species boldly pattered, with bright rufous heads and dark body either heavily spotted or streaked with white or buff; *Canirallus* and *Mentocrex* generally brown to rufous in color, sometimes with white barring on flanks or spotting in wings
- Wings short, rounded; tail short to very short, fluffy in flufftails
- Body small, ovoid, compact
- Bill slender; short in *Sarothrura*, slightly longer and heavier in *Canirallus* and *Mentocrex*
- Head medium-sized, slightly elongate; neck thick
- Legs medium-long; feet strong
- Males more boldly patterned and brightly colored than females in *Sarothrura*



Madagascar Woodrail, *Mentocrex kioloides*. Masoala NP, Madagascar. © Dubi Shapiro.





**Habitat** Most flufftail species inhabit swamps and flooded grasslands throughout sub-Saharan Africa. A few species occur in thickets and forests. The African woodrails, as their name suggests, live in forested habitats.

**Food** Flufftails and woodrails primarily feed on insects and other invertebrates, including snails. Small vertebrates, including small frogs, also contribute to the diet of some species. Some flufftails also eat seeds and other plant material.

**Breeding** Flufftails and woodrails are presumed to be monogamous with biparental care. Because of the secretive nature of the members of this group, little is known of their breeding behavior. In *Sarothrura*, nests are cups woven of grass, leaves, and reeds that are placed on the ground. Some species of flufftails cover their nests with a roof of grass, leaves, twigs, and roots, whereas others construct simple open cup nests. In at least one species, the Buff-spotted Flufftail *Sarothrura elegans*, males construct the nest. The African woodrails build large open bowl-nests of reeds and grasses placed on the ground. Females may lay 2 to 6 eggs. Both males and females are known to incubate the eggs. Chicks leave the nest shortly after hatch-

Only very recently did we realize that these small rail-like birds of sub-Saharan Africa and Madagascar are more closely related to finfoots than they are to the rails that they so resemble. Also like the rails, these are some of the birds about which we know the least. They are hard to find, and lucky observers may see a bird flitting out from dense vegetation for a few moments, only to disappear again as quickly as it appeared. Many have tiny and disjunct ranges, raising the possibility of migrations and undetected populations over much of Africa. Perhaps, with this new-found recognition of their distinct evolutionary history, we will be learning more about them soon.



Madagascar Flufftail, *Sarothrura insularis*. Andasibe-Mantadia (Perinet) NP, Madagascar. © Dubi Shapiro.

ing and are cared for, at least in some species, by both males and females.

**Conservation** Habitat destruction for agriculture, development, or forest resource extraction poses a serious threat to four sarothrurid species (33%). Two are flufftails and two are wood-rails; all are thought to have restricted ranges and small populations. The Tsingy Woodrail *Mentocrex beankaensis* may also be at risk from hunting (1 NT, 1 VU, 1 EN, 1 CR).

**Relationships** The flufftails and woodrails are part of Gruiformes. Although they have long been considered part of the large and diverse family of Rallidae, recent genetic data have shown that the flufftails and woodrails belong outside the rails, and are in fact sister to the finfoots (Heliornithidae). We have tentatively included *Mentocrex* here, though specific molecular justification for this is lacking. Heliornithidae and Sarothruridae together appear to be sister to Rallidae (Hackett *et al.* 2008, Garcia-R *et al.* 2014).



Striped Flufftail, *Sarothrura affinis*. Golden Gate Highlands NP, South Africa. © Hugh Chittenden.



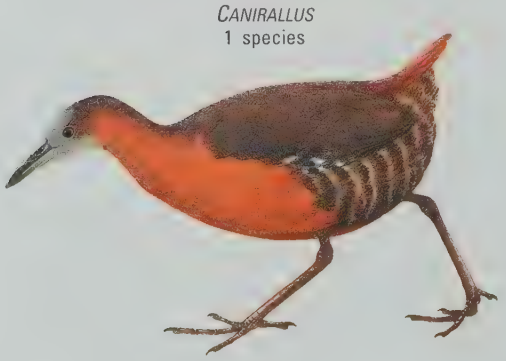
Buff-spotted Flufftail, *Sarothrura elegans*. Near Umhlanga, KwaZulu-Natal, South Africa. © John McKean.

*SAROTHRURA*
9 species



*S. pulchra*
White-spotted Flufftail

*CANIRALLUS*
1 species



*C. oculeus*
Gray-throated Rail

*MENTOCREX*
2 species



*M. kioloides*
Madagascar Woodrail

Gruiformes

# RALLIDAE
## Rails and Coots

36 genera • 131 species

**Related Families** Heliornithidae (Sungrebe and finfoots), Sarothruridae (flufftails and African woodrails)

**Similar Birds** Tinamous (Tinamidae), mesites (Mesitornithidae), finfoots (Heliornithidae), grebes (Podicipedidae), ducks (Anatidae)

**Description**
- Plumage brown, black, or gray; many with barring, especially on the flanks
- Wings short, rounded; tail short and soft
- Bill short and deep to long, slim, and slightly decurved
- Body small to medium, laterally compressed in some
- Head small; some species with a frontal shield; neck thick, medium to long
- Legs and toes long, lobed in coots
- Sexes similar

**Habitat** Rallids live in a wide variety of habitats, from marshes to grasslands to forest. The coots and gallinules are usually more closely tied to water, with coots well adapted for swimming.

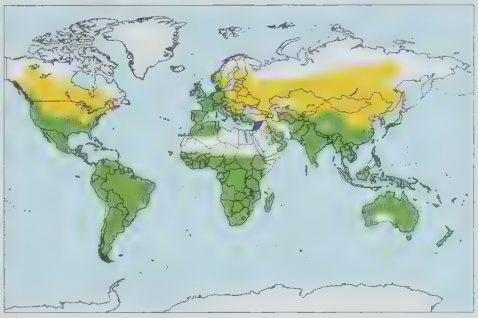
**Food** Most rails are omnivorous, taking both a wide variety of plant material and animals ranging from small invertebrates to fish, frogs, and small mammals. The gallinules and coots include some species that feed almost entirely on vegetation.

**Breeding** Most rails are monogamous, but this large family includes different species displaying polygyny, polyandry, and promiscuity. Some species, such as the Common Gallinule *Gallinula chloropus*, are extraordinarily flexible in their breeding social behavior, in different situations breeding in a monogamous, polygynous, or polyandrous fashion, or as a cooperative breeder or an intraspecific brood parasite. Most rails nest on the ground, but some nest in trees, using old nests of other bird species. Rails generally make cup-shaped nests of vegetation, although some make domed nests. The number of eggs laid can vary from 1 to 15, with 5 to 10 typical for most. In monogamous species, both parents typically participate in all parental duties, including nest-building, incubation, and care of chicks. Incubation takes 13 to 34 days, and both synchronous and asynchronous



Australian Crake, *Porzana fluminea*.
Campbell's Swamp, New South Wales, Australia. © Drew Fulton.





From tiny mouse-like black rails to the purple Takahe the size of a small goose, Rallidae spans a large morphological and ecological range. Most are secretive denizens of reeds, yet the gallinules and coots lead lifestyles more like ducks, out in the open where their rough-and-tumble social behavior is visible to all. It is surprising that such shy residents of isolated habitats are actually migratory, at least in part, and rails have colonized virtually every island on Earth. Volant enough to get there, they often stayed put and started small populations. Flightlessness evolved numerous times, and endemic flightless rail species populated many of the islands of the Pacific; sadly almost all of them are now extinct.



Black Crake, *Amaurornis flavirostra*. Lake Awasa, Southern Nations, Nationalities and Peoples' Region, Ethiopia. © Ian Davies.

hatching occurs. Chicks are precocial and able to leave the nest soon after hatching, foraging with their parents and only gradually gaining independence from them.

**Conservation** Over the past 400 years, 26 rail species are known to have become extinct as a result of human activity, and many additional species probably vanished before ever being described (Steadman & Martin 2003). Many rail species (37%) suffer from habitat destruction and fragmentation, and on islands where there are non-native predators, many endemic rails either have recently gone extinct or are at risk of extinction (15 NT, 18 VU, 9 EN, 4 CR, 1 EW). In New Zealand, for example, the Takahe *Porphyrio hochstetteri* survives in a remote remnant of its former habitat where it can escape from predation by introduced stoats *Mustela erminea* as well as competition and habitat destruction by introduced red deer *Cervus elaphus*. Its population's prospects have been much improved by its introduction to several small islands where introduced mammals have been removed.

**Relationships** The rails have long been seen as a core part of Gruiformes (Ericson *et al.* 2006a, Fain *et al.* 2007, Hackett *et al.* 2008), within which Rallidae is likely sister to the clade made up of Heliornithidae plus Sarothruridae (Garcia-R *et al.* 2014).



Buff-banded Rail, *Hypotaenidia philippensis*. Lady Elliot Island, Queensland, Australia. © Graeme Chapman.

Subfamily **HIMANTORNITHINAE**

*HIMANTORNIS*
1 species



*H. haematopus*
Nkulengu Rail

Subfamily **RALLINAE** (1 of 3)

*RALLICULA*
4 species



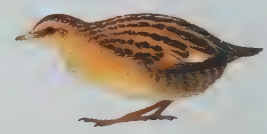
*R. forbesi*
Forbes's Forest-rail

*RALLINA*
4 species



*R. eurizonoides*
Slaty-legged Crake

*COTURNICOPS*
3 species



*C. noveboracensis*
Yellow Rail

*MICROPYGIA*
1 species



*M. schomburgkii*
Ocellated Crake

*RUFIRALLUS*
2 species



*R. viridis*
Russet-crowned Crake

*LATERALLUS*
10 species



*L. leucopyrrhus*
Red-and-white Crake

*RALLUS*
13 species



*R. aquaticus*
Western Water Rail

*ARAMIDOPSIS*
1 species



*A. plateni*
Snoring Rail

*LEWINIA*
4 species



*L. striata*
Slaty-breasted Rail

*HABROPTILA*
1 species



*H. wallacii*
Drummer Rail

*GALLIRALLUS*
3 species



*G. australis*
Weka

*EULABEORNIS*
1 species



*E. castaneoventris*
Chestnut Rail

*HYPOTAENIDIA*
10 species



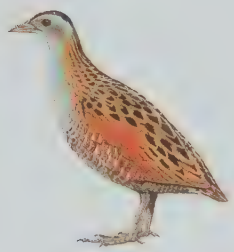
*H. okinawae*
Okinawa Rail

*DRYOLIMNAS*
1 species



*D. cuvieri*
White-throated Rail

*CREX*
2 species



*C. crex*
Corncrake

*ROUGETIUS*
1 species



*R. rougetii*
Rouget's Rail

*ATLANTISIA*
1 species



*A. rogersi*
Inaccessible Rail

*ARAMIDES*
7 species



*A. cajaneus*
Gray-necked Wood-Rail

*AMAUROLIMNAS*
1 species



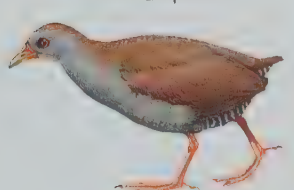
*A. concolor*
Uniform Crake

*CYANOLIMNAS*
1 species



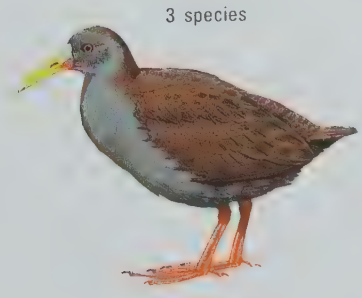
*C. cerverai*
Zapata Rail

*NEOCREX*
2 species



*N. erythrops*
Paint-billed Crake

*PARDIRALLUS*
3 species



*P. sanguinolentus*
Plumbeous Rail

*GYMNOCREX*
3 species



*G. rosenbergii*
Blue-faced Rail

*HAPALOCREX*
1 species



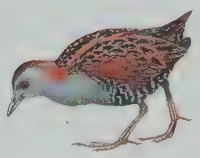
*H. flaviventer*
Yellow-breasted Crake

*PORZANA*
6 species



*P. carolina*
Sora

*ZAPORNIA*
10 species



*Z. pusilla*
Baillon's Crake

*AMAURORNIS*
7 species



*A. phoenicurus*
White-breasted Waterhen

*MEGACREX*
1 species



*M. inepta*
New Guinea Flightless Rail

*GALLICREX*
1 species



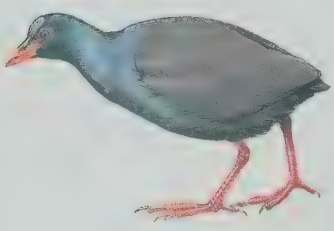
*G. cinerea*
Watercock

*PORPHYRIO*
5 species



*P. porphyrio*
Purple Swamphen

*PAREUDIASTES*
2 species



*P. silvestris*
Makira Moorhen

*GALLINULA*
6 species



*G. chloropus*
Common Moorhen

*TRIBONYX*
2 species



*T. ventralis*
Black-tailed Native-hen

*FULICA*
10 species



*F. gigantea*
Giant Coot

Gruiformes

# PSOPHIIDAE
## Trumpeters

1 genus • 6 species

**Related Families** Gruidae (cranes), Aramidae (Limpkin)

**Similar Birds** Turkeys (Phasianidae), guineafowls (Numididae), tinamous (Tinamidae)

**Description**
- Loose, soft, velvety plumage, mostly black, with contrasting lighter colors in the wings in some
- Rounded wings, held slightly arched and fanned over the back at rest; tail short, with full tail coverts; these, along with curved wings, lend hump-backed profile
- Body medium-sized, ovoid
- Bill short, deep, slightly decurved
- Head small; neck long though often held close to body
- Legs long with long, strongly clawed toes
- Sexes similar

**Habitat** Trumpeters live in lowland tropical rainforest.

**Food** Trumpeters' diets consist largely of fruit. Only the pulp of fruit is digested; for large fruits, only the fleshy portion of the fruit is consumed, leaving the seeds uneaten. Invertebrates make up a small but significant portion of trumpeters' diets, and, on rare occasions, trumpeters will eat small vertebrates.

**Breeding** The mating system of the trumpeters is cooperatively polyandrous, with a single dominant female mating most with a single dominant male, but also with subordinate male group members. Subordinate females are prevented from mating by the dominant pair. Trumpeters nest in natural tree cavities or cavities that have been created by other animals, and they do not build a nest inside the cavity. The dominant female lays 2 to 3 eggs. The dominant pair and subordinate males all participate in incubation, which lasts about 28 days. Chicks are precocial and leave the nest within a day of hatching, jumping, sometimes over 10 m, from the nest to the forest floor. There, they are fed by all adult members of the group, including to a lesser extent the subordinate females, for at least the first three weeks of life in the forest. They only gradually start feeding themselves, finally becoming able to gather all their own food by about three months of age.



White-winged Trumpeter, *Psophia leucoptera*. Manu NP, Peru. © Dubi Shapiro.



Trumpeters are mid-sized ground birds of the lowland rainforests of South America. Valued by humans for making loud calls (though not particularly trumpet-like) when disturbed and for reputedly protecting chicken flocks from predators, they wander in and out of villages as commensals, often splitting their time between village and forest. Trumpeters have a long neck and hold their small head high. These features, combined with a drape of hair-like secondary coverts over slightly arched wings, give trumpeters a hunchbacked profile. The soft, silky plumage tops off this odd appearance. It is amazing that these seemingly bulky and long-legged birds nest in tree holes.

**Conservation** Most species of trumpeters (83%) are thought to have rapidly declining populations due to deforestation in the Amazon rainforest. Increasing fragmentation is also leading to greater hunting pressure on many species, further contributing to rapid declines (2 NT, 1 VU, 1 EN, 1 CR).

**Relationships** Recent phylogenetic studies have confirmed that the trumpeters are part of Gruiformes, the group to which they have long been assigned. Molecular and morphological studies both indicate that Psophiidae is sister to a clade made up of Gruidae and Aramidae (Livezey & Zusi 2007, Ericson *et al.* 2006a, Fain *et al.* 2007, Hackett *et al.* 2008, Yang *et al.* 2010).



Gray-winged Trumpeter, *Psophia crepitans*. Tiputini Biodiversity Station, Ecuador. © D. W. Winkler.

*PSOPHIA*
6 species



*P. crepitans*
Gray-winged Trumpeter

# ARAMIDAE

Limpkin

1 genus • 1 species

**Related Families** Gruidae (cranes), Psophiidae (trumpeters)

**Similar Birds** Ibises (Threskiornithidae), woodrails (Rallidae)

**Description**

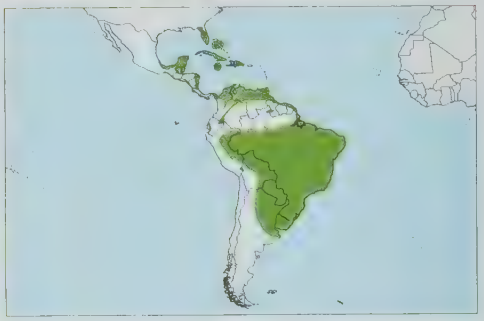
- Plumage brown with lance-shaped white markings on the neck, and in one subspecies, on the back
- Wings broad, medium in length; tail short, square-tipped
- Body medium-sized, tapered ovoid, often with upright carriage
- Bill long, slender, laterally compressed; mandible slightly scooped to one side near tip
- Head small; neck long, slender
- Legs and toes long; claws medium length
- Males larger than females

**Habitat** The Limpkin is found in a wide variety of lowland, freshwater wetlands throughout the Neotropics, from wooded swamps through more open wetlands.



Limpkin, *Aramus guarauna*.
Palo Verde NP, Guanacaste, Costa Rica. © D. W. Winkler.





The Limpkin often walks with what seems to be a light-footed step coordinated with movements of the neck and head, suggesting to some a limping gait. Throughout the Neotropics, its range shadows that of the large and widespread apple snail. To fit this diet, Limpkins have evolved a subtly asymmetric bill, with the lower bill bearing a shallow scoop that is just the right curvature and sharpness to slide into a shell to extract the snail. The Limpkin has a variety of local names, most of which relate to its great diversity of calls and cries. The screams of this bird, heard on a dark, steamy night, can have a blood-curdling effect on unaccustomed human listeners.

**Food** The Limpkin's primary food is *Pomacea* apple snails, but it also feeds on a variety of other snail species and mussels. Limpkins use their specially shaped bill to extract snails from their shells. They hold their prey in their feet, and use their bill to cut the muscles holding the snail in its shell, then proceed to remove it and eat it whole.

**Breeding** Limpkins are monogamous with biparental care, nesting in a wide variety of locations. They may build their nest on the ground, as a floating mat, in a tree, or in dense grasses. Nests are constructed from whatever is within reach of the nest site, including grasses and other aquatic vegetation, sticks, leaves, and moss. Females typically lay 4 to 7 eggs, and incubation takes about 27 days. Both parents are active in nest-building, incubation, and caring for the chicks. Chicks remain at the nest for a week, and then leave in the company of the parents. Parents remove snails from the shells for the chicks, and the chicks eat them whole.

**Conservation** The Limpkin faces no immediate conservation concerns.

**Relationships** Although the Limpkin was long a taxonomic enigma, most recent genetic and morphological studies are consistent in placing it within Gruiformes (Cracraft 1981, Livezey & Zusi 2001, 2007, Ericson *et al.* 2006a, Fain *et al.* 2007, Hackett *et al.* 2008). These studies further indicate that Aramidae and Gruidae are sister taxa, and, taken together, they are in turn sister to Psophiidae.



Limpkin, *Aramus guarauna*. Palo Verde NP, Guanacaste, Costa Rica. © D. W. Winkler.

*ARAMUS*
1 species



*A. guarauna*
Limpkin

Gruiformes

# GRUIDAE
## Cranes

6 genera • 15 species

**Related Families** Aramidae (Limpkin), Psophiidae (trumpeters)

**Similar Birds** Herons (Ardeidae), Secretarybird (Sagittariidae), storks (Ciconiidae)

**Description**
- Plumage primarily white or gray accented with black and red
- Wings large and broad; tail short but with shaggy downward-curved coverts
- Body large, ovoid
- Long, straight, thin bill
- Head small; neck very long, thin
- Legs long; feet sturdy, with long toes
- Sexes similar; males larger than females

**Habitat** Cranes inhabit a wide variety of open habitats. Most species prefer wet areas; however, some species are highly terrestrial and prefer drier habitats, even nesting in deserts if some water is available.

**Food** Cranes have a very generalized diet, from leaves, nuts, berries, insects, and small vertebrates (mammals, snakes, lizards, birds) in upland habitats to rhizomes, tubers, aquatic invertebrates, and fish in aquatic habitats.

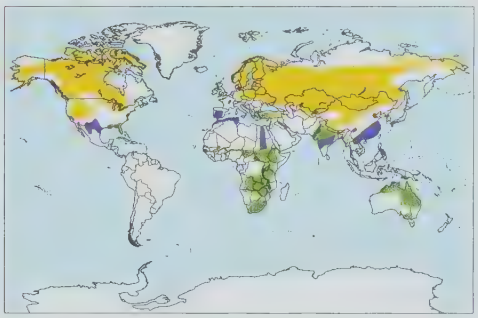
**Breeding** Cranes are strictly monogamous, and their elaborate courtship dances reinforce existing pair bonds. Mated pairs will remain together for life; however, pairs that are unsuccessful in breeding attempts will often dissolve and the birds will find new mates. Cranes typically nest on the ground, with nests being a simple mound of vegetation topped by a shallow depression, often on islands in shallow lakes or ponds to protect against predators. A typical clutch is 2 eggs, although *Balearica* cranes lay 3 or 4 eggs, and the Wattled Crane *Bugeranus carunculatus* regularly lays only a single-egged clutch. Both parents participate in nest construction, and both incubate, brood, and help raise the chicks. Incubation takes 28 to 36 days, and in many species the precocial chicks leave the nest soon after hatching, attended by the parents.

**Conservation** Loss and degradation of wetlands and grassland habitat, along with hunting and, for some species, trade in birds, have put many crane species (73%) at risk of extinction (7 VU, 3 EN, 1 CR). Siberian Crane *Leucogeranus leucogeranus* is listed as critically endangered, as development projects threaten one of its main



Gray Crowned-Crane, *Balearica regulorum*.
Sosian Ranch, Rumuruti, Laikipia County, Kenya. © Albie Venter.





Cranes are elegant ambassadors from Earth's open spaces, their haunting cries and exuberant courtship dances having suggested deep meaning to peoples in many cultures for many centuries. Crowned-cranes are adorned with golden tiaras and boldly patterned wings, but most species are more soberly clad, with gray or white coats accented with black and with variable patches of bare red facial skin. All distinctively fly with their necks outstretched, not folded in an S shape. Few spectacles of nature can surpass that of thousands of cranes settling into a spring migratory stopover at dusk, calling and sporadically dancing in anticipation of the breeding drama that awaits them to the north.



White-naped Crane, *Antigone vipio*. Arasaki, Kagoshima, Japan. © Ian Davies.

wintering areas. Two other endangered species, Whooping Crane *Grus americana* and Red-crowned Crane *G. japonensis*, have been the focus of intensive conservation measures, and their populations have been increasing steadily since they reached population lows of fewer than 40 adults in the middle of the last century.

**Relationships** Gruidae forms part of one of two deep clades within Gruiformes, within which it is most likely sister to Aramidae. This crane/Limpkin group is in turn sister to Psophiidae. The other deep gruiform clade comprises Rallidae and Heliornithidae (Ericson *et al.* 2006a, Fain *et al.* 2007, Hackett *et al.* 2008).



Red-crowned Crane, *Grus japonensis*. Akan NP, Hokkaido, Japan. © Ian Davies

Subfamily **BALEARICINAE**

*BALEARICA*
2 species



*B. regulorum*
Gray Crowned-Crane

Subfamily **GRUINAE**

*LEUCOGERANUS*
1 species



*L. leucogeranus*
Siberian Crane

*ANTIGONE*
4 species



*A. antigone*
Sarus Crane

*BUGERANUS*
1 species



*B. carunculatus*
Wattled Crane

*ANTHROPOIDES*
2 species



*A. virgo*
Demoiselle Crane

*GRUS*
5 species



*G. japonensis*
Red-crowned Crane

# Order: CHARADRIIFORMES

Charadriiformes comprises a diverse group of avian lineages. Many (but not all) of the birds in this order are closely associated with wet environments such as marshes and bogs, ponds and lakes, beaches and rocky shores, or the open ocean. The members of Charadriiformes are only weakly grouped by morphological characters (Cracraft 1981, Ericson *et al.* 2003a, Livezey 2010b); however, their grouping receives strong support from molecular phylogenetic studies, which have suggested that some charadriiform genera are surprisingly old, possibly having originated before the Cretaceous-Paleogene boundary about 66 million years ago (Baker *et al.* 2007a).

Studies based on morphological characters have traditionally placed Charadriiformes close to Gruiformes (Cracraft 1981, Livezey & Zusi 2007). In contrast, in the extensive molecular phylogenetic study by Hackett *et al.* (2008), Charadriiformes is sister to a diverse group of "higher landbirds," which includes raptors (Accipitriformes, Falconiformes), parrots (Psittaciformes), rollers and woodpeckers (Coraciiformes), trogons (Trogoniformes), and the songbirds (Passeriformes), among others. These two groups—Charadriiformes plus the higher landbirds—are in turn sister to a clade that includes a large group of "waterbird" and other orders, including the tubenoses (Procellariiformes), the wading and other waterbirds (Pelecaniformes, Suliformes, and Ciconiiformes), and Gruiformes, as well as Cuculiformes. In another comprehensive study of broad-scale relationships, the exact position of Charadriiformes was not recovered, and instead, the order was part of a polytomy that included the waterbirds and the higher landbirds (Ericson *et al.* 2006a). The most recent broad-scale study, by Jarvis *et al.* (2014), placed Charadriiformes as sister to Gruiformes, with those two clades together sister to Hoatzin. In this analysis, this clade of three orders appears to be sister to much the same set of higher landbirds and waterbirds indicated by Hackett *et al.* (2008). Although other molecular phylogenetic studies have suggested other relationships, most do not sample widely enough across birds to be highly informative at this deep level of divergence; for example, most studies of relationships within Charadriiformes do not include any members of Hackett *et al.*'s higher-landbird clade.

Relationships within the living Charadriiformes are fairly well resolved, and the group of late has been divided into three suborders, Charadrii, Scolopaci, and Lari (e.g., Cracraft 2013). We will present each of these as separate groups in that order.



Black-winged Stilt, *Himantopus himantopus*. Near Darkwood Beach, Antigua. © Piotr Jonczyk.

# Order: CHARADRIIFORMES, CHARADRII

## Families: Burhinidae, Chionidae, Pluvianellidae, Pluvianidae, Haematopodidae, Ibidorhynchidae, Recurvirostridae, Charadriidae

The suborder Charadrii is the sister group to the remaining two suborders of Charadriiformes (Baker *et al.* 2007a, Pereira & Baker 2010). Within Charadrii, Charadriidae (plovers), the largest family within the group, is sister to a group comprising oystercatchers (Haematopodidae), avocets and stilts (Recurvirostridae), and Ibisbill (Ibidorhynchidae) (Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010, Baker *et al.* 2012). The Egyptian Plover *Pluvianus aegyptius*, traditionally grouped with the coursers and pratincoles (Glareolidae), appears instead to be sister to this large plover-stilt-oystercatcher clade and is thus accorded here a family of its own. The thick-knees (Burhinidae) appear to be sister to the clade made up of sheathbills (Chionidae) and Magellanic Plover (Pluvianellidae), and these three taken together are in turn sister to all other Charadrii (Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010, Baker *et al.* 2012).



Southern Lapwing, *Vanellus chilensis*. Buenos Aires, Argentina. © Ramón Casares.

Charadriiformes, Charadrii

# BURHINIDAE
## Thick-knees

2 genera · 10 species

**Related Families** Chionidae (sheathbills), Pluvianellidae (Magellanic Plover)

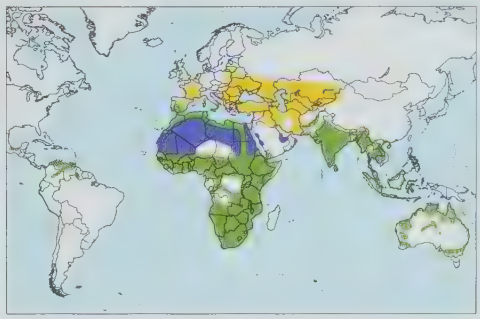
**Similar Birds** Bustards (Otididae), lapwings (Charadriidae), coursers (Glareolidae)

**Description**
- Plumage cryptic; black, white, and shades of gray and brown; many species with distinct black-and-white eye-stripe or eye-ring
- Wings long, rounded, often not extended fully in flight; tail medium-long, graduated
- Body streamlined ovoid; shoulders broad
- Bill generally short and stout; medium-long and heavy in some species
- Head large, broad; eyes very large; neck generally held close to body, but quite often extended to full length, lending these birds a variable profile
- Legs long, with slightly thickened tibiotarsal joint and net-like scales rather than scutes; feet partially webbed with three toes, lacking a hallux
- Sexes similar



Senegal Thick-knee, *Burhinus senegalensis*. Droga Dese, Addis Ababa, Ethiopia. © Piotr Jonczyk.





The thick-knees are large terrestrial "shorebirds" that can often be found far from water. Big-eyed and cryptically patterned, they are primarily nocturnal, revealing themselves with cries that emanate out across the wide expanses of open country at night. By contrast, most spend the daylight hours quietly in the shade of a bush when available. Their long wings are not as pointed as those of most charadriiforms, and when opened, they expose bold stripes of black and white or spots of white that contrast sharply with their generally camouflaged plumage. Their "knees" (actually ankles would be more accurate) are indeed a little thicker than the rest of the leg, but only slightly more so than those of other birds in their order.

**Habitat** The thick-knees are found primarily in dry, open habitats, from open savanna and arid scrubland to open grasslands and stony deserts. One *Esacus* species, however, is tied to coastal habitats.

**Food** Burhinids feed primarily on insects, worms, and spiders, with some species taking small vertebrates (lizards, frogs, and rodents). Most species forage at night.

**Breeding** Thick-knees are monogamous with biparental care. Most nest solitarily, but some species may nest in small groups. Nests of thick-knees are a simple scrape on the ground, in the open with no cover, under a bush, or near a clump of grass. Clutch size ranges from 1 to 3, with 2 eggs being typical. Both parents construct the nest, incubate, and care for the chicks once they hatch. Incubation takes 24 to 27 days, and the precocial chicks leave the nest within a day of hatching. Their parents find them food at first and protect them from predators, displaying with outstretched patterned wings when necessary. The chicks fledge in about six or seven weeks.

**Conservation** Two species of thick-knees (20%), both in the genus *Esacus*, are thought to be declining due to habitat destruction, dis-



Beach Thick-knee, *Esacus magnirostris*. Torres Strait, Queensland, Australia. © Drew Fulton.

turbance, and the introduction of non-native predators (2 NT).

**Relationships** The thick-knees are part of the suborder Charadrii. Owing to the superficial similarity of the thick-knees to the bustards, those groups were sometimes grouped together, often as members of Gruiformes. More recent investigations of morphological and genetic characters have instead consistently placed the thick-knees within the shorebirds (Cracraft 1981, Livezey & Zusi 2007). Most recent studies have placed Burhinidae as sister to the rest of the suborder Charadrii (Fain & Houde 2007, Hackett *et al.* 2008), likely as part of a small clade that also includes Chionidae and Pluvianellidae (Thomas *et al.* 2004, Baker *et al.* 2007a, Baker *et al.* 2012).



Double-striped Thick-knee, *Burhinus bistriatus*. Palo Verde NP, Guanacaste, Costa Rica. © D. W. Winkler.



Senegal Thick-knee, *Burhinus senegalensis*. Lompoul Desert, Senegal. © Reinder Doeleman.



Charadriiformes, Charadrii

# CHIONIDAE
## Sheathbills

1 genus • 2 species

**Related Families** Pluvianellidae (Magellanic Plover), Burhinidae (thick-knees)

**Similar Birds** Pigeons (Columbidae), gulls (Laridae)

**Description**
- Plumage white
- Wings long, relatively rounded; tail short, rounded
- Body medium-sized, ovoid
- Bill short, conical, pink or black; horny sheath and caruncle at base
- Head medium-sized and rounded; front half of face bare; neck short
- Legs short, stout; feet large, toes thick
- Sexes similar

**Habitat** Sheathbills usually associate closely with colonies of seabirds or pinnipeds. In some areas, sheathbills forage in intertidal zones.

**Food** Sheathbills are extremely opportunistic and feed on a wide range of items. During their breeding season, sheathbills are closely associated with penguin and pinniped colonies, taking eggs and small chicks and readily eating carcasses or afterbirth. When penguin chicks become too large to take, sheathbills steal regurgitated food meant for penguin young, and they will do the same from other returning seabird parents. During the winter, when penguin and other seabird colonies disperse, sheathbills feed on invertebrates on land and in the intertidal zone. Sheathbills are the only non-passerines in their Antarctic and sub-Antarctic range that forage only terrestrially.

**Breeding** Sheathbills are monogamous with biparental care and pair bonds that typically last over several seasons. Sheathbill nests are simple cups made of kelp, grass, feathers, and bones, usually hidden in rock crevices in or very near seabird colonies, though a few nest near intertidal areas instead. Females typically lay 2 or 3 eggs. Both parents participate in all aspects of parental care, including nest-building, incubation, and feeding chicks. In most populations, breeding is timed so that sheathbill chicks hatch while penguin chicks are being fed, ensuring a ready source of food. Chicks hatch asynchronously after 28 to 32 days of incubation. They are brooded almost continuously for the first two weeks, and they are fed in the nest for the first month, after which they start roaming. By about two months of age, they gradually become independent of their parents.

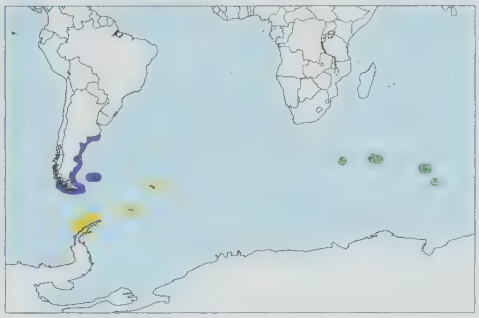
**Conservation** Sheathbills face no immediate conservation risk.

**Relationships** Sheathbills are part of the suborder Charadrii of Charadriiformes. Morphological characters place Chionidae close to Laridae (Livezey & Zusi 2007), but recent molecular phylogenetic analyses suggest that Chionidae belongs near the base of the Charadrii radiation as sister to Pluvianellidae. These two families are likely sister to Burhinidae, forming a group that is sister to the rest of Charadrii (Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007a, Baker *et al.* 2012).



Snowy Sheathbill, *Chionis albus*.
Gourdin Island, Antarctic Peninsula. © Santiago Imberti.





In the glaring summer landscapes of Antarctica, the garbage collectors wear white. Named for the odd horny sheath that covers the top half of their bills, these birds defend territories that include part of a seal or penguin colony. Like stocky white pigeons, sheathbills scurry around stealing or scavenging scraps for their own hungry young: bits of seal afterbirth, a morsel of penguin egg missed by a skua, a little regurgitated krill spilled by a penguin. The breeding season concluded, some relocate to other foraging areas, but many of the western species fly across the water and straggle north along Southern Ocean coasts as far as the winter weather pushes them.



Snowy Sheathbill, *Chionis albus*. Gourdin Island, Antarctic Peninsula. © Santiago Imberti.

*CHIONIS*
2 species



*C. minor*
Black-faced Sheathbil

# PLUVIANELLIDAE

## Magellanic Plover

1 genus • 1 species

**Related Families** Chionidae (sheathbills), Burhinidae (thick-knees)

**Similar Birds** Ground-doves (Columbidae), plovers (Charadriidae), sandpipers (Scolopacidae)

**Description**

- Plumage pale gray on upperparts, white on belly
- Wings long, pointed; tail broad, medium length
- Body small and ovoid
- Bill short and pointed, like that of turnstones
- Head small, rounded; iris yellow (juveniles) or red (adults); diffuse dark eye-line; neck short, thick
- Legs and feet short and thick, bright pink with black nails in adults
- Sexes similar; males larger than females

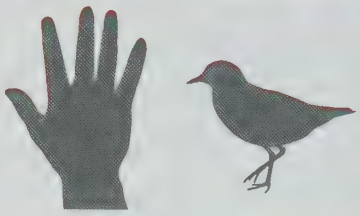
**Habitat** Magellanic Plovers breed along the open shores of freshwater and brackish lakes in the Patagonian uplands and move to the coast in winter, where they forage on mudflats, typically in sheltered bays, river mouths, and lagoons.

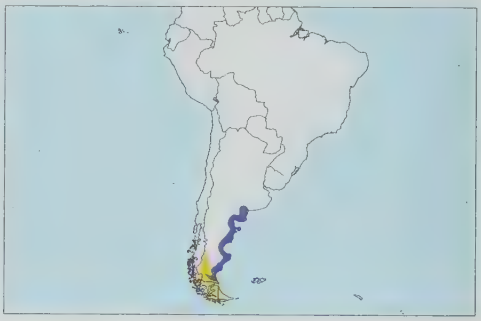
**Food** Pluvianellids feed on insects and other invertebrates, picking up items and turning over small stones and shells in search of prey. They stomp at the ground and scratch and dig with their feet in search of food.

**Breeding** Magellanic Plovers are monogamous with biparental care. They construct their nests by scraping the ground on gravel shores close to the water's edge and lining the indentation with gravel. Females generally lay 2 eggs. Both the male and female incubate the eggs and care for the chicks. The chicks are precocial but are fed regurgitated food by both parents from their enlarged crops. The chicks can fly at about a month of age, but they can still be fed by their parents for ten days further.



Magellanic Plover, *Pluvianellus socialis*. Monte León NP, Santa Cruz, Argentina. © Santiago Imberti.





**Conservation** The sole species in this family, the Magellanic Plover is at risk from habitat degradation on both its breeding and wintering grounds (1 NT). Although no data indicate that the population is declining, the species has a relatively small global population and occupies a very small range.

**Relationships** Pluvianellidae forms part of the suborder Charadrii. As the common name suggests, Magellanic Plovers were long considered to be part of Charadriidae, but recent investigations of both morphology and genetics have shown that they are only very distantly related to the other birds commonly termed plovers. The preponderance of the morphological and molecular evidence suggests that Pluvianellidae is sister to Chionidae, and that this clade of two families is sister to Burhinidae (Cracraft 1981, Baker *et al.* 2007a, Fain & Houde 2007, Livezey 2010b).

Magellanic Plovers live along lakes, playas, and estuaries in the wind-scoured open spaces of far southern Patagonia. Plovers in name only, they have a form and behavior reminiscent of a small, long-legged dove. In contrast to the running-and-snatching strategy of true plovers, these birds are much more methodical, pecking repeatedly as they walk, often bobbing up and down as they go. And occasionally, unlike any other shorebird, they will go to great lengths to dig into the substrate with their feet to go after food. Indeed, if the food seems to justify the effort, a foraging bird will dig a hole nearly its own body size after only a few minutes of steady work.



Magellanic Plover, *Pluvianellus socialis*. Tierra del Fuego, Chile. © Nick Athanas.

*PLUVIANELLUS*
1 species



*P. socialis*
Magellanic Plover

Charadriiformes, Charadrii

# PLUVIANIDAE
## Egyptian Plover

1 genus • 1 species

**Related Families** Recurvirostridae (stilts and avocets), Haematopodidae (oystercatchers), Charadriidae (plovers)

**Similar Birds** Coursers (Glareolidae), plovers (Charadriidae)

**Description**
- Plumage striking; crown, face, nape, and back black; throat and breast buff; wings pale gray; distinct white eye-stripe and black breast-band
- Wings short and rounded; tail short
- Body small, fusiform
- Bill short, thin, pointed, slightly decurved
- Head slightly elongate, of medium size
- Legs moderately long; feet with three moderately short toes, lacking hallux
- Sexes similar

**Habitat** Egyptian Plovers frequent sandbars and gravel beds along lowland tropical rivers.

**Food** Egyptian Plovers feed on a wide variety of invertebrate prey, mainly insects. They obtain prey by picking items from the ground, probing the sand, turning over stones, or catching flying insects while running.

**Breeding** Egyptian Plovers are monogamous with biparental care. Nests consist of deep scrapes located on gravel and sandbar islands. Females lay 1 to 3 eggs, with 2 or 3 being typical. If either parent senses danger or leaves the nest during the incubation period of 28 to 31 days, it uses its bill to cover the eggs with sand. After hatching, adults treat their chicks similarly to eggs, burying and wetting them to protect them from predators and the heat. Both parents care for the eggs and chicks in this manner. The chicks leave the nest the day they hatch, and both parents feed them until they are about a week old. The chicks become independent after about a month of parental care.

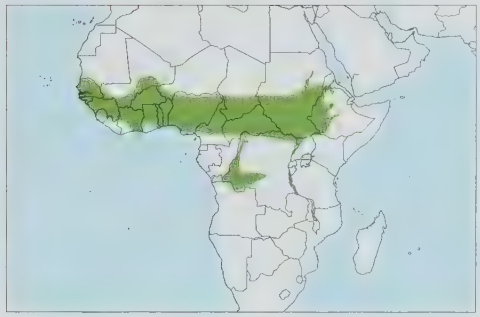


Egyptian Plover, *Pluvianus aegyptius*. Niokolo Koba NP, Senegal. © Piotr Jonczyk.

**Conservation** The Egyptian Plover faces no immediate conservation risks. However, its range has contracted in historical times, and it has been extirpated from the Nile River valley.

**Relationships** The Egyptian Plover represents an old lineage within the suborder Charadrii of Charadriiformes (Baker *et al.* 2007a, Fain & Houde 2007). Traditionally, it was thought to be a courser (Glareolidae), but molecular phylogenetic studies suggest that it is instead sister to a large radiation that includes Charadriidae, Haematopodidae, Ibidorhynchidae, and Recurvirostridae (Baker *et al.* 2007a, Fain & Houde 2007).



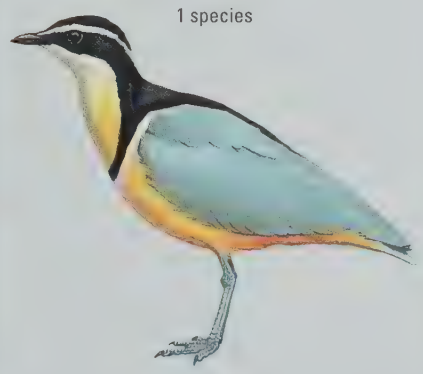


The Egyptian Plover is neither a plover nor, any longer, an inhabitant of Egypt. Widespread along large open rivers in central Africa, these birds feed along the shore, picking invertebrates from the ground, but apparently not, as is often said, from the mouths of basking crocodiles. They dig an unusually deep scrape on riparian sandbars, and to moderate the heat reaching the eggs from the searing tropical sun, they leave the eggs at least partially buried even when they are incubating, often cooling the sand by transferring water from soaked belly feathers. The chicks leave the nest the day they hatch, but they, too, can be cooled by the parent's wet feathers or by being buried in sand.



Egyptian Plover, *Pluvianus aegyptius*. Gambela, Gambela Peoples' Region, Ethiopia. © Ian Davies.

*PLUVIANUS*
1 species



*P. aegyptius*
Egyptian Plover

# HAEMATOPODIDAE
## Oystercatchers

1 genus • 9 species

Related Families Ibidorhynchidae (Ibisbill), Recurvirostridae (stilts and avocets)

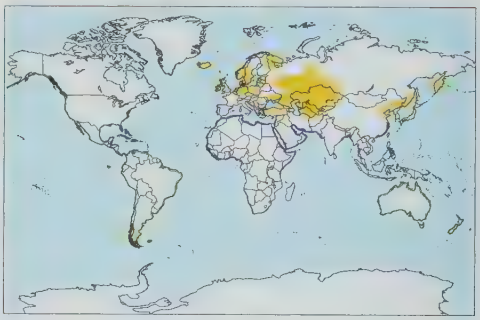
Similar Birds Crab Plover (Dromadidae), stilts and avocets (Recurvirostridae)

Description
- Plumage either all black or black with white belly and rump
- Wings long and pointed with bold white patterns in some species; tail short and square
- Bill bright red-orange, long and robust, laterally compressed
- Body elongate ovoid in shape, of medium size
- Head of medium size; eyes large, either red (Old World) or yellow (New World), with brightly colored orbital rings; neck fairly short, thick, muscular
- Legs short for a charadriiform, thick; toes short, webbed at base, hallux absent; legs and feet pink
- Sexes very similar except females often have dark flecks in eyes



Variable Oystercatcher, *Haematopus unicolor*.
Tiritiri Matangi Island, New Zealand. © Simon Fordham / NaturePix.





Habitat Oystercatchers live primarily in coastal habitats, with pied species on mudflats and sandy beaches and all-black species usually on rocky coasts. Most species nest directly on shore, but some nest in grassy pastures farther inland.

Food Oystercatchers eat bivalved mollusks as well as worms and a wide variety of other invertebrates. Individual Eurasian Oystercatchers *Haematopus ostralegus* with pointed bill tips prefer worms and crustaceans; those with chisel-tipped bills are the prototypical oystercatchers that stab the muscle of a bivalve before it can close, and those with thicker blunt-tipped bills hammer into a shell once it is closed. Experiments with captive birds show that changing diet leads to changed bill type in as little as a few weeks (Swennen *et al.* 1983).

Breeding Oystercatchers are monogamous with biparental care. Their nests consist of simple scrapes that may be lined with shells or small rocks, and are typically situated to offer good visibility. Females usually lay 2 to 4 eggs, with typical clutch size of 3 eggs in the Northern Hemisphere and 2 eggs in the Southern Hemisphere. Both sexes incubate the eggs for a period of about a month. Oystercatcher chicks leave the nest shortly after hatching; however, they are unable to forage on their own and thus depend on the adults to feed them. The chicks can fly 30 to 50 days post-hatch, but adults provide food for their chicks until they are about six months old.

Conservation Two oystercatcher species (22%) are at risk (1 NT, 1 EN), and one has recently gone extinct. The endangered Chatham Island Oystercatcher *H. chathamensis* has an extremely small, but recently increasing, total population size. It is still vulnerable, however, to serious weather events and accidental introductions of mammalian predators. The African Black Oystercatcher *H. moquini* is currently experiencing breeding failure related to human disturbance. The Canary Islands Oystercatcher *H. meadewaldoi* went extinct in the 1940's, presumably due to human over-harvesting of intertidal invertebrates and to predation by introduced rats and cats.

Relationships The oystercatchers are part of the suborder Charadrii of Charadriiformes. Morphological and genetic analyses have consistently placed the oystercatchers as sister to Ibidorhynchidae, forming a clade that is in turn sister to Recurvirostridae (Cracraft 1981, Sibley & Ahlquist 1990, Livezey & Zusi 2007, Ericson *et al.* 2003a, Paton & Baker 2006, Fain & Houde 2007, Baker *et al.* 2007a).



Eurasian Oystercatcher, *Haematopus ostralegus*. Nesseby, Varanger Peninsula, Norway. © Piotr Jonczyk.

The bill of an oystercatcher is laterally compressed, possessing razor-sharp edges for cutting the muscles of clams, oysters, and mussels with a lightning-quick jab. With the mollusk thus prevented from closing up, the oystercatcher can dine at its own pace. Generally birds of marine coasts, only in a few places do oystercatchers spend much time inland. In those places they often feast on earthworms, a habit that leads in only a few weeks to substantial differences in bill depth and sharpness. This is a stellar example of how rapidly bill form can adjust to the prey birds are eating, and it raises the interesting question of why oystercatchers elsewhere are so set in their ways.

*HAEMATOPUS*
9 species



*H. leucopodus*
Magellanic Oystercatcher

Charadriiformes, Charadrii

# IBIDORHYNCHIDAE
## Ibisbill

1 genus • 1 species

Related Families Haematopodidae (oystercatchers), Recurvirostridae (stilts and avocets)

Similar Birds Ibises (Threskiornithidae), curlews (Scolopacidae)

Description
- Plumage brown on back, neck and head slaty gray, belly white; black face and cap and black breast-band, both outlined in white
- Wings medium-long, deep, and rounded; tail short, square-tipped
- Body medium-sized, ovoid fusiform
- Bill long, decurved, blood-red
- Head small; neck long
- Legs short and thick, grayish-purple; toes short, thick, with fleshy broad soles and a very small web at base of two; hallux absent
- Sexes similar; females slightly larger than males

Habitat Ibisbills frequent mountain rivers and streams, particularly shingle-bed rivers, containing extensive stretches of pebbles, cobbles, and small boulders.

Food Ibisbills predominantly eat larvae of aquatic insects, such as stoneflies and caddisflies, along with some small proportion of aquatic fish. They forage primarily by plucking prey from the moving water or by using their bills to search under larger rocks, generally foraging in from the water's edge, up to belly-deep.

Breeding Ibisbills appear to be monogamous with biparental care. They construct a simple scrape, occasionally lined with small pebbles, on the bank or small gravel bar of a stream. Females typically lay 2 to 4 eggs, and both parents are active in incubating and brooding their chicks. Although they do not appear to directly feed their chicks, parents remain with them into the first winter; well after the chicks can fly, at about 50 days post-hatch, the parents are still ready to attack or to distract threats to their chicks.

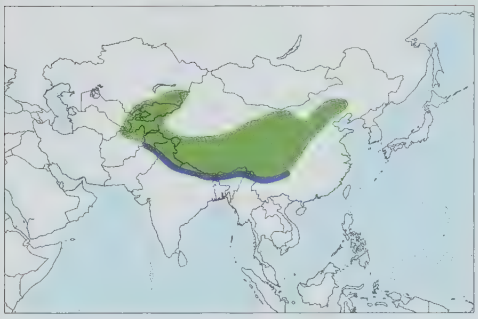
Conservation Ibisbills currently face no immediate conservation risks.

Relationships The Ibisbill is the sole member of Ibidorhynchidae, within the suborder Charadrii of Charadriiformes. Morphological and genetic evidence suggests that Ibidorhynchidae is sister to Haematopodidae, and that these two families together are sister to Recurvirostridae (Livezey & Zusi 2007, Baker *et al.* 2007a, Pereira & Baker 2010, Mayr 2011).



Ibisbill, *Ibidorhyncha struthersii*. Jangothang, Jigme Dorji NP, Bhutan. © Jon Irvine.





Few birds are as striking in both plumage and ability to camouflage as the Ibisbill. The bold lines on its breast and face can instantly blend into the landscape of river cobbles in which it lives. Sometimes swimming from one shore to the other, Ibisbills frequent streams of the Himalayan and Central Asian plateaus, using their down-curving bills to probe for food around large cobbles of about the same curvature. With a remote range and a retiring, solitary lifestyle, Ibisbills have thus far managed to keep many aspects of their natural history to themselves. They mostly stay within their breeding range of the high plateaus of Asia year-round, but some birds wander south to lower elevations in winter.



Ibisbill, *Ibidorhyncha struthersii*. Jangothang, Jigme Dorji NP, Bhutan. © Jon Irvine.

*IBIDORHYNCHA*
1 species



*I. struthersii*
Ibisbill

# RECURVIROSTRIDAE

## Stilts and Avocets

3 genera • 7 species

**Related Families** Haematopodidae (oystercatchers), Ibidorhynchidae (Ibisbill)

**Similar Birds** Oystercatchers (Haematopodidae), sandpipers (Scolopacidae), flamingos (Phoenicopteridae)

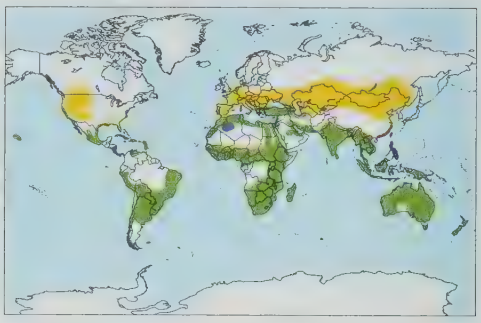
**Description**

- Plumage boldly patterned, typically with black wings and white underparts; some species with buff-orange head or band across the breast
- Wings long and pointed, some with bold white bars on wings; tail short
- Body slim ovoid, generally held near horizontal; medium in size
- Bill long and slender; straight in stilts, recurved in avocets
- Head small; neck long
- Legs extremely long and slender, pink in stilts, gray-blue in avocets; hallux absent in stilts, elevated and tiny in avocets; no webbing in stilts, webbing of all three front toes in avocets.
- Sexes similar in stilts; females with shorter, more strongly recurved bills in avocets



Black-winged Stilt, *Himantopus himantopus*. Near Darkwood Beach, Antigua. © Piotr Jonczyk.





With slender bills, long necks, and a pair of seemingly endless legs to match, stilts and avocets feed on invertebrates from shallow lakes and lagoons worldwide. Like flamingos, they are most common where fish are absent and competition for their aquatic prey is least. Stilts jab each prey item from the water one at a time, whereas avocets feel for their prey by sweeping their elegant up-curved bills beneath the surface back and forth as they walk. Both forage out in the water as far as their very long legs will take them, and avocets will even use their webbed feet to competently swim across deeper waters. These birds are opportunistic breeders, carefully selecting isolated nesting sites to gain protection from terrestrial predators.

**Habitat** Stilts and avocets inhabit shallow waters, all the way from fresh to extremely saline, more commonly the latter.

**Food** Stilts and avocets feed on a wide variety of aquatic invertebrates and small aquatic vertebrates, typically foraging in deeper water than other shorebirds. Stilts generally pluck items from the surface, whereas avocets have a stereotyped foraging method called "scything," where an individual sweeps its bill from side to side in the water or along the surface of mud.

**Breeding** Stilts and avocets are monogamous with biparental care. Most species nest colonially when local numbers of breeders are high, and breeding tends to be variable in space and time according to the vagaries of changing water levels, which determine the availability of isolated nesting sites and prey. Females typically lay 3 or 4 eggs, and both parents incubate them. In hot areas, adults soak their belly feathers in water to cool the eggs and prevent them from overheating. After an incubation period of 19 to 26 days, the precocial chicks leave the nest within a day of hatching and forage with the adults; both parents brood them when needed during the first week or so after they leave the nest. In many aspects of breeding, the highly colonial Banded Stilt is exceptional. Breeding



Red-necked Avocets, *Recurvirostra novaehollandiae*. Birdsville Track, South Australia. © Drew Fulton.

in Australia's outback, in a complex of shallow and ephemeral playa lakes, they are the only charadriiforms with pure white chicks, lacking any darker markings on their down. The chicks from large numbers of nests gather together into a crèche that moves *en masse* from the breeding site to feeding grounds sometimes over 100 km distant. But in these exceptional birds, as in the other recurvirostrids, the chicks become independent of the parents' protection two to ten months after hatching.

**Conservation** Introduced mammalian predators and severe habitat loss have brought the Black Stilt *Himantopus novaezelandiae* to the brink of extinction (1 CR). The population of this New Zealand endemic declined from nearly 1,000 birds in the 1950's to fewer than 100 only a decade later, and there are now just over 100 mature adult Black Stilts surviving in the wild. Captive breeding and extensive predator control efforts are underway and have led to a slow but steady increase in the population.

**Relationships** Recurvirostridae is included in the suborder Charadrii of Charadriiformes, within which it is sister to a group composed of Haematopodidae plus Ibidorhynchidae (Cracraft 1981, Livezey & Zusi 2007, Sibley & Ahlquist 1990, Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007).



Black-winged Stilt, *Himantopus himantopus*. Pak Thale, Thailand. © Michal Jonczyk.



American Avocet, *Recurvirostra americana*. Lucky Lake, Saskatchewan, Canada. © Nick Saunders.

Subfamily **RECURVIROSTRINAE**

*CLADORHYNCHUS*
1 species

*RECURVIROSTRA*
4 species

Subfamily **HIMANTOPODINAE**

*HIMANTOPUS*
2 species



*C. leucocephalus*
Banded Stilt



*R. avosetta*
Pied Avocet



*H. himantopus*
Black-winged Stilt

# CHARADRIIDAE
## Plovers

12 genera • 71 species

**Related Families** Recurvirostridae (avocets and stilts), Haematopodidae (oystercatchers), Ibidorhynchidae (Ibisbill)

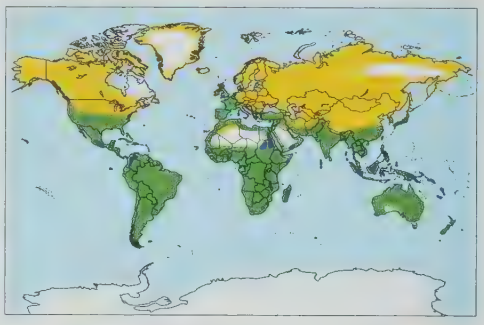
**Similar Birds** Some stout sandpipers (Scolopacidae), Egyptian Plover (Pluvianidae), coursers (Glareolidae)

**Description**
- Plumage typically brown or black above and white below with boldly contrasting accents in black
- Wings long; tail short
- Body small to medium; tapered ovoid
- Bill straight, short, deeper near the tip than mid-bill in many species
- Head medium to large; eyes large; neck generally short
- Legs medium to long; hallux vestigial or lacking; toes generally not webbed, though webbed near toe bases in some
- Sexes generally similar; males more brightly colored or boldly patterned in some



American Golden Plover, *Pluvialis dominica*. Churchill, Manitoba, Canada. © Andy Johnson.





**Habitat** Plovers occupy a diversity of open habitats. Many *Charadrius* species nest in high Arctic tundra, and farther south, plovers and lapwings can be found in almost any open habitat, from desert, open savanna, or alpine tundra (puna in South America) to beaches, golf courses and lawns, and mudflats.

**Food** Plovers feed primarily on insects, worms, and small crustaceans, with seeds and berries added in occasionally, especially, perhaps, when amassing fat stores for long transoceanic journeys.

**Breeding** Plovers are primarily monogamous with biparental care, and a few species are occasionally polygynous. The Eurasian Dotterel *Eudromias morinellus* is polyandrous, with females competing for males and leaving them after mating to raise the clutch alone. In the Mountain Plover *Charadrius montanus*, the female lays two clutches; one clutch is incubated and cared for by the male, and the second by the female. Nests, as in the majority of Charadriiformes, are simple scrapes in the ground, usually constructed by the males and sometimes lined with scant grass or leaves. Plovers typically lay a clutch of 3 or 4 eggs. The eggs, as well as the chicks, are cryptic and well camouflaged. The extremely precocial chicks hatch after 21 to 30 days of incubation, and are able to evade a human within hours of hatching and to feed themselves from the start. Both male and female share incubation and chick-tending duties.

**Conservation** Land-use changes, hunting, and introduced predators on islands are all causes

From the demure Diademed Sandpiper-Plover of the high Andes to the various species of assertive and aggressive *Vanellus* lapwings worldwide, the plovers span a considerable spectrum. But in terms of their ecology, they are remarkably uniform. They are birds of very open shores, taking prey from the surface of sand or mud in a series of short runs punctuated with abrupt stops to jab, look for predators and more prey, then move on. As in waterfowl, the smaller species are more likely to protect their nests by stealth, whereas the larger stand and defend. Such size differences pertain to flight styles as well: most smaller plovers have fast direct flight, while the lapwings fly with more leisurely deep strokes of their broader wings.



Gray Plover, *Pluvialis squatarola*. Cozumel, Mexico. © John McKean.

for the decline in many plover species (24%; 9 NT, 3 VU, 2 EN, 3 CR). One critically endangered species, the Javan Lapwing *Vanellus macropterus*, has not been definitively recorded since 1940 and may already be extinct. Another, the Sociable Lapwing *V. gregarius*, is the subject of extensive conservation efforts after undergoing drastic population declines, perhaps driven by hunting pressures.

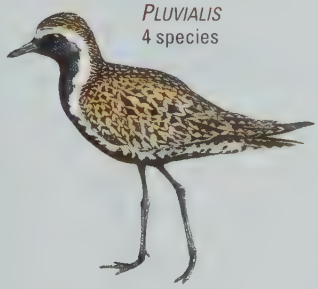
**Relationships** Plovers are in the suborder Charadrii of the diverse order Charadriiformes. Charadriidae appears to be sister to a clade that includes Haematopodidae and Recurvirostridae (Ericson *et al.* 2003a, Baker *et al.* 2007a, Fain & Houde 2007, Baker *et al.* 2012). Whereas some recent studies based on mitochondrial DNA markers have suggested that the "black-bellied plovers" of the genus *Pluvialis* fall well outside of the Charadriidae (Ericson *et al.* 2003a, Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010), a more comprehensive study found support for their inclusion in the Charadriidae, albeit as the sister subfamily to the rest of the plovers (Baker *et al.* 2012).



Andean Lapwing, *Vanellus resplendens*. Abra Pampa, Jujuy, Argentina. © Ramón Casares.

## Subfamily PLUVIALINAE

*PLUVIALIS*
4 species



*P. fulva*
Pacific Golden Plover

*EUDROMIAS*
1 species



*E. morinellus*
Eurasian Dotterel

*CHARADRIUS*
33 species



*C. vociferus*
Killdeer

*HOPLOXYPTERUS*
1 species



*H. cayanus*
Pied Lapwing

*VANELLUS*
24 species



*V. tectus*
Black-headed Lapwing

## Subfamily CHARADRIINAE

*OREOPHOLUS*
1 species



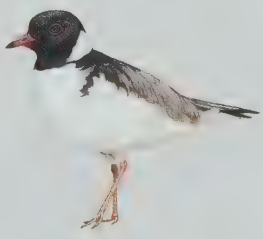
*O. ruficollis*
Tawny-throated Dotterel

*PHEGORNIS*
1 species



*P. mitchellii*
Diademed Sandpiper-Plover

*THINORNIS*
2 species



*T. cucullatus*
Hooded Plover

*ELSEYORNIS*
1 species



*E. melanops*
Black-fronted Dotterel

## Subfamily VANELLINAE

*ERYTHROGONYS*
1 species



*E. cinctus*
Red-kneed Dotterel

*PELTOHYAS*
1 species



*P. australis*
Inland Dotterel

*ANARHYNCHUS*
1 species



*A. frontalis*
Wrybill

# Order: CHARADRIIFORMES, SCOLOPACI

## Families: Pedionomidae, Thinocoridae, Rostratulidae, Jacanidae, Scolopacidae

The suborder Scolopaci is sister to the suborder Lari. Within Scolopaci, the diverse sandpiper family Scolopacidae is sister to the remaining four families in this suborder, and these four are paired: Plains-wanderer (Pedionomidae) sister to seed-snipes (Thinocoridae), and painted-snipes (Rostratulidae) sister to Jacanidae (Ericson *et al.* 2003a, Baker *et al.* 2007a, Baker *et al.* 2007b, Fain & Houde 2007, Hackett *et al.* 2008, Gibson 2010, Pereira & Baker 2010, Gibson & Baker 2012).



Buff-breasted Sandpiper, *Calidris subruficollis*. Canning River, Alaska, USA. © Ian Davies.

Charadriiformes, Scolopaci

# PEDIONOMIDAE

Plains-wanderer

1 genus • 1 species

**Related Families** Thinocoridae (seedsnipes)

**Similar Birds** Buttonquails (Turnicidae), *Coturnix* quails (Phasianidae), tinamous (Tinamidae), rails (Rallidae)

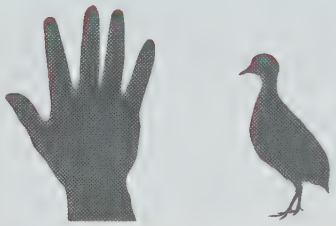
**Description**

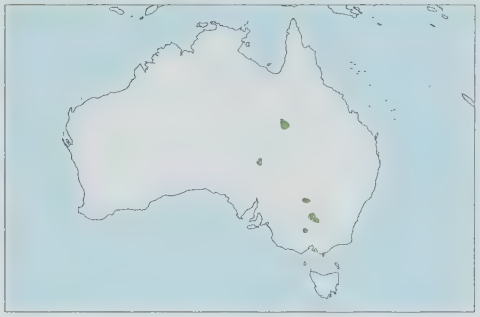
- Plumage cryptic, dominated by pale brown, darker on top, with scalloped pattern in black and buff on back and wings
- Wings rounded, short; tail extremely short
- Body small and ovoid with upright carriage
- Bill short, thin
- Head small, rounded, with large eyes, neck medium-long
- Legs medium length; toes long and delicate; legs and feet yellow
- Females more boldly patterned and brightly colored than males, with bold black-and-white striped collar and rufous upper chest

**Habitat** The Plains-wanderer inhabits sparsely vegetated areas of native short-grass grasslands, avoiding pastureland with introduced species and large expanses of bare ground.



Plains-wanderer, *Pedionomus torquatus*. Terrick Terrick NP, Victoria, Australia. © Drew Fulton.





**Food** *Pedionomus* feeds during the day and especially at dawn and dusk on the seeds of grass and saltbush (*Atriplex*) and a wide variety of invertebrates, especially ants, beetles, and caterpillars.

**Breeding** The Plains-wanderer is thought to be polyandrous, with females contributing little to each breeding attempt before leaving to find their next mate. Nests of Plains-wanderers consist of a simple scrape in the ground, usually lined with grass, often placed at the base of an overhanging grass clump for cover and concealment. Females can lay 2 to 5 eggs, but a typical clutch contains 4 eggs. Incubation, which takes 23 days, is mainly performed by males, although females may incubate on some occasions. Males provide all the post-hatching care. Although the male may not feed the chicks directly, he defends them vigorously. Chicks are precocial and leave the nest shortly after hatching, but remain with the adult male for about two months before becoming independent.

**Conservation** The only species in this family, the Plains-wanderer faces serious conservation concerns (1 EN) due to the continued destruction and degradation of its preferred native grasslands, which are being lost primarily to cultivation and overgrazing. Much has been learned of the habitat requirements of the Plains-wanderer, and considerable conservation measures, particularly the preservation of large tracts of suitable habitat, must be implemented to ensure the continued survival of the species.

**Relationships** Pedionomidae is in the suborder Scolopaci of Charadriiformes. This enigmatic family has had a varied taxonomic history and was sometimes allied with Turnicidae in Gruiformes. Studies based on morphological characters suggested instead that the Plains-wanderer should be in Charadriiformes (Olson & Steadman 1981, Livezey & Zusi 2007). DNA-DNA hybridization studies uncovered a close relationship with Thinocoridae (Sibley & Ahlquist 1990), a finding that has been supported in subsequent molecular phylogenetic studies that place Pedionomidae sister to Thinocoridae within a clade that also includes Rostratulidae and Jacanidae (Paton & Baker 2006, Baker *et al.* 2007b, Fain & Houde 2007, Gibson & Baker 2012, Hackett *et al.* 2008).

Although it appears to be crepuscular, feeding largely at dawn and dusk, the Plains-wanderer is most easily found at night, roosting on sparsely grassed plains. The birds are reluctant to fly, and they can be followed for some time from a car outfitted with a searchlight. With an upright carriage and unhurried locomotion, they bear a much greater resemblance to a dramatically scaled-down ratite than to other shorebirds. The Plains-wanderer appears to be serially polyandrous, with males providing most parental care and females being more brightly colored. Females may contribute at times; they are especially noted for their vigilance, standing on the tips of their toes with neck upstretched and bobbing their heads as they search for predators.



Plains-wanderer, *Pedionomus torquatus*. Deniliquin, New South Wales, Australia. © Christopher L. Wood.



*PEDIONOMUS*
1 species

*P. torquatus*
Plains-wanderer

# THINOCORIDAE
## Seedsnipes

2 genera • 4 species

Related Families Pedionomidae (Plains-wanderer)

Similar Birds Quails and partridges (Phasianidae), sandgrouse (Pteroclidae), doves (Columbidae), buttonquails (Turnicidae)

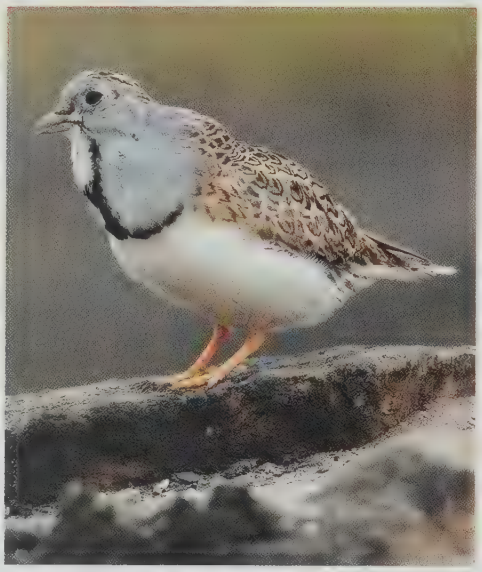
Description
- Plumage cryptic, dominated by scalloped patterns of brown, gray, and tan
- Wings long, pointed; tail medium length
- Body small, ovoid
- Bill short, conical, pointed; nostrils slit-like with an operculum
- Head small, rounded; neck short, thick
- Legs short; toes long with black nails; legs and feet yellow
- Males of *Thinocorus* with bold patterns of white, gray, and black on face and breast; sexes similar in *Attagis*

Habitat Seedsnipes live in grasslands, steppe, arid semi-desert, and high alpine habitats of the Andes and Patagonia, avoiding areas with vegetation higher than short grass.

Food Thinocorids browse on a wide range of leaves, buds, and other green vegetation, sometimes including a high proportion of succulent plants. Seeds are also taken, especially when green vegetation is scarce.

Breeding Data on the breeding biology of the seedsnipes are scarce. It appears that they are monogamous with biparental care. Males perform elaborate song flights by night, and perch on high rocks or posts and sing during the day. The nests of seedsnipes are simple scrapes in the ground, sometimes lined with sparse moss or other plant material and usually placed near the base of a grass tussock, rock, or small shrub. Females typically lay 3 or 4 eggs. Only the female incubates the eggs and broods the chicks. While the female incubates, for about 26 days, the male is constantly vigilant for predators. If forced from the nest, the female will cover the eggs with plant material and soil. Chicks are completely precocial and leave the nest as soon as they are dry from hatching. Both male and female accompany the chicks, but do not appear to feed them, and the chicks can fly by about seven weeks of age.

Conservation There are no immediate conservation concerns for the seedsnipes.



Least Seedsnipe, *Thinocorus rumicivorus*. Lomas de Lachay, Peru. © Dubi Shapiro.



These shorebirds of the vast, sparsely vegetated habitats of Patagonia and the high Andes are more like tiny grouse or sandgrouse in their habits than they are like sandpipers or plovers. Uniquely, in an order of carnivores, seedsnipes subsist on a diet of seeds and green vegetation. In contrast to their grouse-like bills, short legs, and thickened toes, they retain the long wings and fast, able flight of their shorebird cousins. Their nests and eggs are very like others in this order, and their chicks, in typical charadriiform fashion, enter the world as diminutive yet capable fuzz-balls. In spring, males proclaim their territories with repeated booming dove-like notes, from atop a boulder or during a sandpiper-like song flight.



Rufous-bellied Seedsnipe, *Attagis gayi*. Lauca NP, Chile. © Nick Athanas.

**Relationships** The seedsnipes are part of the suborder Scolopaci of Charadriiformes. Owing to their odd morphology, the classification of the seedsnipes was long enigmatic, although they were most often placed within Charadriiformes. Cracraft (1981) tentatively placed the seedsnipes close to the sheathbills, whereas previous studies had placed them close to the sandpipers and their allies, a relationship also supported by the morphological analyses of Livezey & Zusi (2007). Molecular phylogenetic studies confirm that Thinocoridae falls within Scolopaci, where it seems most likely to be sister to Pedionomidae (Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007, Gibson & Baker 2012). These two families are in turn sister to Jacanidae and Rostratulidae, collectively forming a well-supported clade that together is sister to Scolopacidae (Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007b, Fain & Houde 2007, Gibson & Baker 2012).



Gray-breasted Seedsnipe, *Thinocorus orbignyianus*. El Yeso, Central Andes, Chile. © D. W. Winkler.



White-bellied Seedsnipe, *Attagis malouinus*. Ushuaia, Tierra del Fuego, Argentina. © Luke Seitz.

*ATTAGIS*
2 species



*A. gayi*
Rufous-bellied Seedsnipe

*THINOCORUS*
2 species



*T. orbignyianus*
Gray-breasted Seedsnipe

# ROSTRATULIDAE
## Painted-snipes

2 genera • 3 species

**Related Families** Jacanidae (jacanas)

**Similar Birds** Snipes (Scolopacidae), rails (Rallidae)

**Description**
- Plumage cryptic, dominated by shades of brown, buff, and olive; white on belly
- Wings medium length, rounded, broad, with intricate patterning and barring that produces an effective startling display when wings are spread suddenly; tail short and square
- Body small, ovoid
- Bill long, straight, but rounded and slightly swollen, with droop in some, at the tip
- Head small, rounded, with large eyes; neck medium length
- Legs and toes long
- Female larger, more brightly colored and boldly patterned in Old World (*Rostratula*); sexes similar in New World (*Nycticryphes*)

**Habitat** Painted-snipes live in low-elevation marshes and wetlands, including swamps and flooded grasslands.

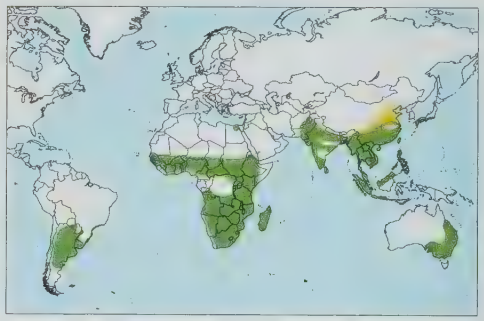
**Food** Rostratulids feed on a wide variety of foods, including insects, mollusks, worms, and crustaceans and the seeds of rice, millet, and other grasses.

**Breeding** Old World *Rostratula* species are polyandrous, whereas the South American species, *Nycticryphes semicollaris*, appears to be monogamous. In *Rostratula*, a female usually associates with a male only long enough to lay a clutch of eggs, then often leaves the male to find a new mate and lay a new clutch. An individual female may mate with up to four males in a season. Painted-snipe nests consist of either a shallow cup nest built of grass or a shallow scrape on the ground, usually concealed under a bush or in a tussock. Females typically lay 2 to 4 eggs, with 2 being typical for *Nycticryphes*, and 4 being typical for *Rostratula*. *Rostratula* females occasionally remain with males and assist with incubation and caring for chicks, but more commonly only males incubate the eggs, for a period of about 18 to 19 days, and brood and feed the chicks. The chicks are precocial and leave the nest as soon as they are dry from hatching, staying close to the father and being fed and brooded as needed by him for the first week or so. Chicks then start feeding themselves and gradually acquire their independence after many weeks in their family group. All of this may be premature generalization, as there are indications that in



Greater Painted-snipe, *Rostratula benghalensis*. Kotu, Gambia. © Piotr Jonczyk.





Painted-snipes are shy denizens of rich tropical freshwater wetlands. With a distinctive round-tipped bill that droops slightly in some species, these birds forage quietly near cover in shallow water and flooded vegetation. When disturbed, they flush in a manner more similar to that of a rail than a snipe, with a relatively slow, silent flight and dangling legs. The Old World species appear to be polyandrous most of the time and the South American likely monogamous. In much of their range, the occurrence of these birds is very hard to predict, and populations in some areas appear to be truly nomadic. Painted-snipes appear to have an unusual ability to detect changes in water levels and adjust their movements in response.



Greater Painted-snipe, *Rostratula benghalensis*. Kruger NP, South Africa. © Con Foley.

some South African populations the mating system is monogamy with full female participation in parenting, and this may occur elsewhere in the Old World. Much less is known about the breeding of *Nycticryphes*, but it may be semi-colonial.

**Conservation** One rostratulid species (33%) faces serious conservation challenges (1 EN). The Australian Painted-snipe *R. australis* has declined substantially over the past few decades as a result of destruction and degradation of wetlands.

**Relationships** Rostratulidae is part of the suborder Scolopaci of Charadriiformes. Previously, it was sometimes placed in Gruiformes; however, all recent studies provide strong support for the inclusion of the painted-snipes within Charadriiformes, where they are most closely related to the jacanas (Cracraft 1981, Livezey & Zusi 2007, Ericson *et al.* 2003a, Baker *et al.* 2007a, Fain & Houde 2007, Hackett *et al.* 2008, Gibson & Baker 2012). Together, Rostratulidae and Jacanidae are sister to a clade that contains Thinocoridae and Pedionomidae (Baker *et al.* 2007a, Fain & Houde 2007, Gibson & Baker 2012).

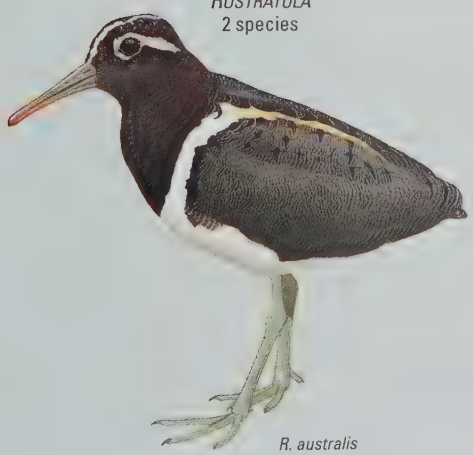


Greater Painted-snipe, *Rostratula benghalensis*. Punggol, Singapore. © Con Foley.



Greater Painted-snipe, *Rostratula benghalensis*. Batu Gajah, Perak, Malaysia. © Con Foley.

*ROSTRATULA*
2 species



*R. australis*
Australian Painted-snipe

*NYCTICRYPHES*
1 species



*N. semicollaris*
South American Painted-snipe

# JACANIDAE
## Jacanas

6 genera • 8 species

**Related Families** Rostratulidae (painted-snipes)

**Similar Birds** Gallinules and rails (Rallidae), pheasants (Phasianidae)

**Description**
- Plumage dominated by black, rufous, and brown, often with patches of white and yellow; two New World species with bright chartreuse wing patches
- Wings broad, rounded, with metacarpal spur; tail short in many species, but extremely long in one (*Hydrophasianus*)
- Body small, ovoid
- Bill short, straight, slender
- Head small; most with forehead, crown, or frontal wattle bare and brightly colored; neck fairly long, slender
- Legs long; toes and claws extremely long
- Females larger than males; sexes otherwise similar

**Habitat** Jacanas live in a variety of shallow freshwater wetlands with emergent or floating vegetation.

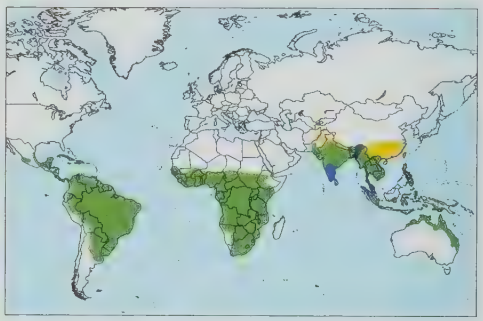
**Food** Jacanas eat mostly insects, mollusks, and crustaceans; in some species at some times, seeds (mostly of water lily) may constitute 20% to 50% of the diet.

**Breeding** The smallest jacana (*Microparra*) appears to be monogamous with biparental care, but all other jacanas appear to be sequentially polyandrous, where a female mates with a male, lays a clutch of eggs for that male to care for, and then moves to another mate. A complete clutch is typically 4 eggs. Within a population of jacanas, not all females are polyandrous, and many ultimately pair with only one male. Genetic data have shown that a clutch of eggs cared for by a particular male is most often exclusively sired by that male. Jacana nests consist of fairly sparse floating mats of vegetation, usually built over shallow water. In some nests, the eggs are in contact with the water, as the nest platform does not rise above the water level, and males spread their wings down and under the eggs, two per wing, to support the eggs against the male's body while he incubates. Females may help with the initial stages of nest construction, but the males conduct the majority of nest-building and are generally solely responsible for incubation, brooding, and caring for the chicks. Incubation takes about a month, and males often provide the young shelter under their wings when dan-



Comb-crested Jacana, *Irediparra gallinacea*.
Tyto Wetlands, Ingham, Queensland, Australia. © Tony Ashton.





Jacanas are the water-striders of the bird world. Though they cannot walk on water, their exceedingly long slender toes, extended by long splint-like nails, allow them to walk on very flimsy floating vegetation. Far more vocal than their near relatives, they spend much of their time far from cover, flying readily whenever danger threatens. As in many families in this order, their polyandrous mating system leaves the males doing all the parental care. The precocial young are capable of feeding themselves from the start, so the father is left watching over them and offering his wings for shelter if danger arrives. With such a precious cargo beneath his wings, he cannot fly away, but parental discretion and anticipation usually allow him to deliver his brood on foot to safety.



Pheasant-tailed Jacana, *Hydrophasianus chirurgus*. Pak Chong, Nakhon Ratchasima, Thailand. © Alex Vargas.

ger threatens. Under threat, chicks may also "snorkel," whereby they completely submerge themselves in the water, with only their bills above the surface to breathe.

**Conservation** While all species of jacanas have likely declined as a result of habitat loss and degradation, one species (12%), the Madagascar Jacana *Actophilornis albinucha*, has declined significantly in recent years from continued hunting pressure and habitat loss (1 NT).

**Relationships** Jacanidae is part of the suborder Scolopaci of Charadriiformes, where it is sister to Rostratulidae, a relationship that is supported by both morphological characters and molecular data (Cracraft 1981, Sibley & Ahlquist 1990, Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007, Livezey & Zusi 2007, Gibson & Baker 2012).



African Jacana, *Actophilornis africanus*. St. Kitts Estate, AMatikulu, KwaZulu-Natal, South Africa. © Guy Upfold.

*JACANA*
2 species



*J. jacana*
Wattled Jacana

*HYDROPHASIANUS*
1 species



*H. chirurgus*
Pheasant-tailed Jacana

*ACTOPHILORNIS*
2 species



*A. africanus*
African Jacana

*METOPIDIUS*
1 species



*M. indicus*
Bronze-winged Jacana

*IREDIPARRA*
1 species



*I. gallinacea*
Comb-crested Jacana

*MICROPARRA*
1 species



*M. capensis*
Lesser Jacana

# SCOLOPACIDAE
## Sandpipers

16 genera • 91 species

**Related Families** Thinocoridae (seedsnipes), Pedionomidae (Plains-wanderer), Rostratulidae (painted-snipes), Jacanidae (jacanas)

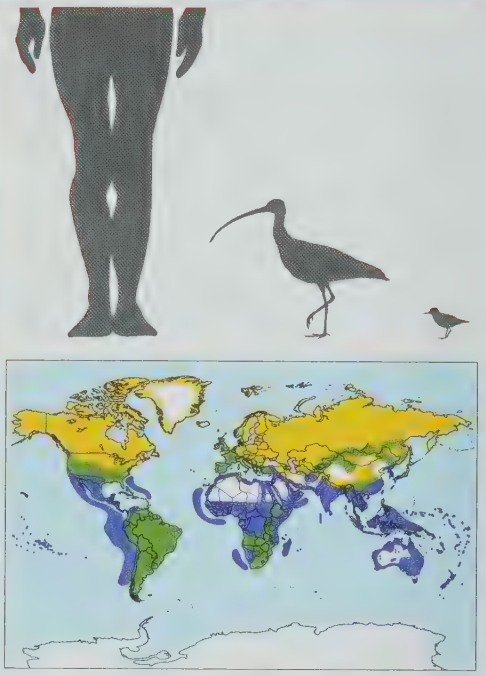
**Similar Birds** Plovers (Charadriidae), stilts (Recurvirostridae), coursers (Glareolidae), Plains-wanderer (Pedionomidae), painted-snipes (Rostratulidae)

**Description**

- Most species brown or gray above and white below, with many having rufous on underparts and as highlights above; back usually streaked and lined cryptically
- Body small to medium, streamlined ovoid in shape
- Bill thin, short, and straight to very long and decurved or slightly recurved
- Head typically small, rounded; neck short to medium-long
- Legs and toes usually long, delicate, partially webbed in some
- Sexual dimorphism highly variable; male or female may be larger or more brightly colored depending on each species' reproductive strategy; many species sexually monomorphic



Marbled Godwit, *Limosa fedoa*.
Goose Lake, Saskatchewan, Canada. © Nick Saunders.



**Habitat** Scolopacids generally prefer to breed in wet, open, grassy habitats, and a large number of species nest on Arctic or subarctic tundra. Other species may breed along beaches or rocky coasts, in forested habitats, or on dry grasslands. During the non-breeding season, most members of this family are found in intertidal habitats, especially mudflats at the mouths of estuaries and in large bays where food is particularly abundant. Other species prefer non-tidal wet grasslands. Phalaropes (*Phalaropus*), are unusual in spending the non-breeding season in the tropics on the open ocean.

**Food** Scolopacids take advantage of the superabundance of insects on their breeding grounds, where the diets consist largely of insect larvae and seed. At other times, their diets consist mostly of other invertebrates, from tiny copepods and cockles to a huge diversity of worms to mid-sized crabs. Some species eat grain on the non-breeding grounds, and many species will eat roots, seeds, and shoots when invertebrates are scarce. But no other species comes close to the plant reliance exhibited by the Tuamotu Sandpiper *Prosobonia parvirostris*, which forages to a great extent on nectar from shrubs and trees on the remote central Pacific atolls where it lives (Burle *et al.* 2013). The bills of many scolopacids are adapted to particular

Most sandpipers are clothed in muted earth-tones that match the simple and elemental habitats where they live, and their bills have evolved to capture invertebrates in mud and sand in almost every conceivable way. Females in some species may achieve higher fecundity by mating with more than one male, and polyandry, polygyny, and monogamy can occur in congeners that look outwardly very plain and very much the same. These different mating systems are associated with some very fluid patterns of movements as well; some species seem to wander from place to place to breed both within and between seasons. In addition some birds in this family make the longest-distance nonstop migrations of any terrestrial bird.



Buff-breasted Sandpiper, *Calidris subruficollis*. Canning River, Alaska, USA. © Ian Davies.

feeding strategies, with curlews (*Numenius*) and godwits (*Limosa*) able to forage deep in mud for their preferred prey, and turnstones (*Arenaria*), which have probably the broadest diet of any scolopacid, able to flip small rocks or dig into a carcass or crab with their wedge-shaped bills. The phalaropes uniquely sit on the water and spin in circles, churning small plankton up to the surface where they are more easily caught.

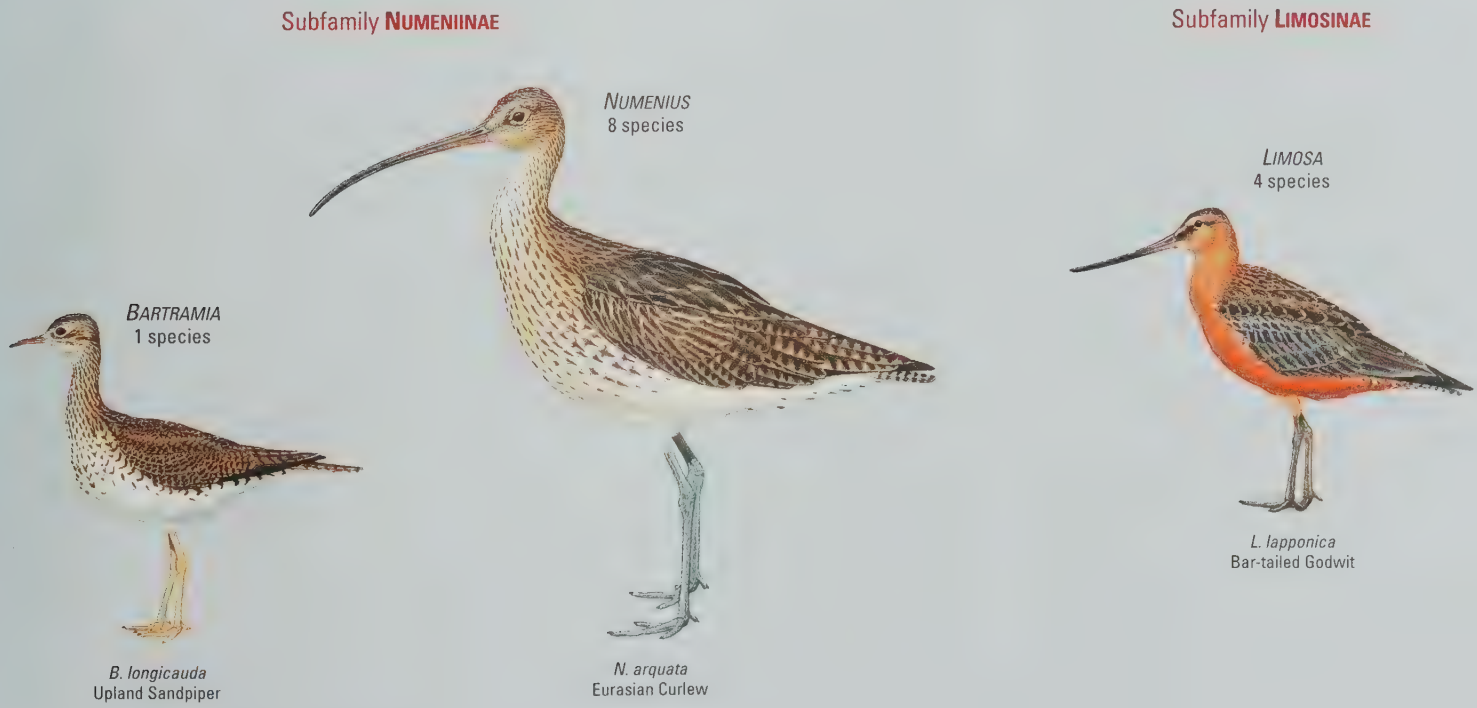
**Breeding** Scolopacids exhibit most of the different mating systems known for birds. Sandpipers in the genus *Calidris* vary from polygynous lek breeders to monogamous to polyandrous breeders. Phalaropes are polyandrous and have marked reverse sexual dichromatism. Some species exhibit multiple mating systems within a single population of the same species, but it appears likely that most species are monogamous most of the time. Most scolopacids nest on the ground, constructing a small cup or depression that may be lined with grass, leaves, or other material, though some in the genus *Tringa* appropriate the abandoned nests of other birds in trees. Most scolopacids lay a clutch of 4 eggs, although they may lay 2 or 3 eggs, especially if laying a replacement clutch. After about three weeks of incubation, the precocial chicks hatch. They generally leave the nest soon thereafter, thermoregulating themselves except in extreme environments, where adults may brood the chicks for many weeks during very cold periods. The chicks generally feed themselves, except in *Gallinago* and *Scolopax*, in which the adults feed the chicks at first.

**Conservation** Scolopacidae includes some of the rarest birds in the world; several species are already extinct, and 27 others (30%) are at risk (14 NT, 7 VU, 3 EN, 2 CR, 1 CR (PE)). One of the most famous sandpipers is the Eskimo Curlew *Numenius borealis*, which was hunted to near extinction in the 19th century in North America, and may now be extinct. The Slender-billed Curlew *N. tenuirostris* has suffered a similar fate, and may likewise be extinct. While hunting pressure forced these two curlews to near extinction, two other well-documented extinctions, of *Prosobonia* species on small Pacific islands, were caused by the introduction of non-native species and habitat destruction. Habitat destruction is the current danger for many other rare and declining shorebirds, including the Spoon-billed Sandpiper *Calidris pygmaea*. Loss of migratory habitat and subsistence hunting on the wintering grounds have all but doomed this peculiar shorebird to extinction, although recent captive breeding measures provide a glimmer of hope.



Common Snipe, *Gallinago gallinago*. Vlaardingen, South Holland, The Netherlands. © Reinder Doeleman.

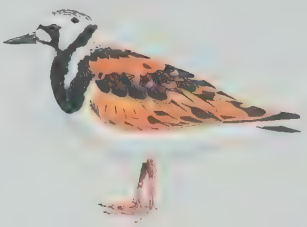
**Relationships** Scolopacidae is part of the suborder Scolopaci of Charadriiformes and appears to be sister to all the other families in this suborder: Jacanidae, Rostratulidae, Thinocoridae, and Pedionomidae (Thomas *et al.* 2004, Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007, Gibson 2010, Pereira & Baker 2010, Gibson & Baker 2012). Within Scolopacidae, Scolopacinae is likely sister to Tringinae, and together these appear to be sister to Calidrinae. Limosinae appears to be sister to these three, with Numeniinae sister to all four subfamilies (Baker *et al.* 2007a, Gibson & Baker 2012).



Subfamily **CALIDRINAE**

Tribe **Arenariini**

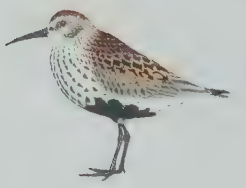
*ARENARIA*
2 species



*A. interpres*
Ruddy Turnstone

Tribe **Calidrini**

*CALIDRIS*
24 species



*C. alpina*
Dunlin

*PROSOBONIA*
1 species

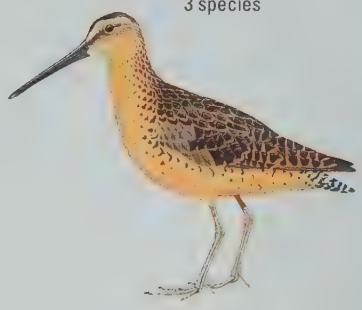


*P. parvirostris*
Tuamotu Sandpiper

Subfamily **SCOLOPACINAE**

Tribe **Limnodromini**

*LIMNODROMUS*
3 species



*L. griseus*
Short-billed Dowitcher

Tribe **Scolopacini**

*SCOLOPAX*
8 species



*S. rusticola*
Eurasian Woodcock

*COENOCORYPHA*
3 species



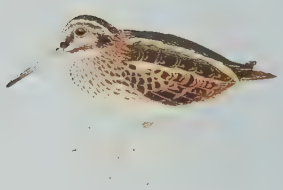
*C. huegeli*
Snares Snipe

*GALLINAGO*
17 species



*G. gallinago*
Common Snipe

*LYMNOCRYPTES*
1 species



*L. minimus*
Jack Snipe

Subfamily **TRINGINAE**

Tribe **Phalaropodini**

*STEGANOPUS*
1 species



*S. tricolor*
Wilson's Phalarope

*PHALAROPUS*
2 species



*P. fulicarius*
Red Phalarope

Tribe **Tringini**

*XENUS*
1 species



*X. cinereus*
Terek Sandpiper

*ACTITIS*
2 species



*A. macularius*
Spotted Sandpiper

*TRINGA*
13 species



*T. totanus*
Common Redshank

# Order: CHARADRIIFORMES, LARI

## Families: Turnicidae, Dromadidae, Glareolidae, Laridae, Stercorariidae, Alcidae

Lari is a diverse suborder with internal relationships that remain somewhat uncertain. Traditional studies of morphological traits have often led to the gulls, terns, skimmers, and skuas and jaegers being placed together in the large family Laridae. Recent molecular phylogenetic investigations, however, have shown that the skuas and jaegers (Stercorariidae) are more likely sister to the alcids (Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010). The relationships among the gulls, terns, and skimmers are still not fully resolved. Different phylogenetic studies have suggested sister relationships between gulls and terns (Ericson *et al.* 2003a), between terns and skimmers (Paton & Baker 2006, Fain & Houde 2007), or between skimmers and gulls (Baker *et al.* 2007a, Pereira & Baker 2010). Baker *et al.* (2007a) further suggested that the terns are paraphyletic, with noddies (*Anous*) and white terns (*Gygis*) being sister to the group that includes gulls, skimmers, and other terns. Given these contrary indications of relationship, we have opted here to keep all gulls, terns, and skimmers together in one large family, Laridae.

Relationships within Lari are more clear at a slightly deeper phylogenetic level, with Laridae being sister to the group comprising Stercorariidae plus Alcidae (Ericson *et al.* 2003a, Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010). Collectively, this group of three families is in turn sister to the coursers and pratincoles (Glareolidae). The monotypic Dromadidae (Crab Plover) is probably sister to the large clade that includes Glareolidae, Stercorariidae, Alcidae, and Laridae (Pereira & Baker 2010).

Turnicidae is the most systematically perplexing member of Charadriiformes. Indeed, this is the only family that has not long been associated with Charadriiformes, traditionally placed instead in Gruiformes when that order had a much broader and more diverse membership. This affinity was based on what were interpreted to be primitive gruiform morphological characters linking them with the mesites. In any event, turnicids were always difficult to assign, and it was always acknowledged that relationships with other taxa were distant. Recent molecular phylogenetic work, however, has repeatedly indicated, with high support, that the turnicids are part of the suborder Lari of Charadriiformes and are likely sister to the rest of the families in this suborder (Baker *et al.* 2007a, Fain & Houde 2007, Hackett *et al.* 2008, Pereira & Baker 2010).



Sabine's Gull, *Xema sabini*. Canning River Delta, Arctic National Wildlife Refuge, Alaska, USA. © Ian Davies.

# TURNICIDAE
## Buttonquails

2 genera · 18 species

**Related Families** Dromadidae (Crab-plover), Glareolidae (coursers and pratincoles), Laridae (gulls, terns, and skimmers), Stercorariidae (skuas and jaegers), Alcidae (auks)

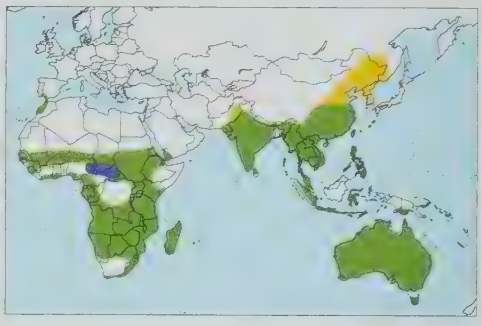
**Similar Birds** *Coturnix* quails (Phasianidae), crakes (Rallidae), Plains-wanderer (Pedionomidae)

**Description**
- Plumage brown above with various amounts of black or rufous on face, chest, and belly; streaked and barred with black and tan above for very cryptic appearance
- Wings short, rounded; tail short, with soft rectrices
- Body small; short ovoid in shape
- Bill short, sharp, thick in some
- Head and eyes medium-sized; neck short
- Legs short, medium-thick; feet lacking hallux
- Females more brightly colored and boldly patterned than males



Common Buttonquail, *Turnix sylvaticus*.
Pak Chong, Nakhon Ratchasima, Thailand. © Alex Vargas.





**Habitat** The buttonquails live in dry tropical and subtropical habitats, including grassland, scrubland, and open woodlands.

**Food** Very little information is available, but diet includes seeds and insects with green plant material and fruits at times as well. It may be that the thicker-billed species eat more seeds, and that birds lacking surface water eat more green vegetation. Buttonquails get almost all of their food off the ground, pivoting on one foot while scratching and pecking in the soil litter, then turning to the other foot and pivoting from there. Some even spread their wings in the midst of searching, perhaps to delay the departure of their insect prey.

**Breeding** Like their feeding ecology, little is known about turnicid breeding biology, with most information derived from observations of captive birds. It is thought that turnicids are mainly serially polyandrous with females laying clutches of eggs with as many as seven different males in a single breeding season. This system can easily remain monogamous: if the female is limited in resources or mates, she can stay with the first male she lays with, though it appears that even in such cases the female takes on limited parental duties. Turnicids nest in a scrape on the ground, usually lined with grass, and typically sheltered by overhanging grass or a bush. Both male and female are active in nest selection. Females typically lay between 2 and 7 eggs, with 4 or 5 being the usual clutch size for most species; turnicids thus appear to be the only charadriiform birds to routinely lay more than 4 eggs in a clutch. In most cases, only the

Buttonquails bear greater resemblance to small Old World *Coturnix* quails than to any of their own shorebird relatives. Indeed, to tell the two apart in the hand, one is sometimes reduced to counting toes: turnicids have only three, lacking the hallux. Like the Plains-wanderer, these birds appear to be serially polyandrous, with the male being much less colorful and performing all the parental care. Interestingly, buttonquail chicks grow rapidly, and they reach sexual maturity after only three months, something that only a few passerines can equal. Little is known about these shy birds, but their distinctive manner of foraging leaves unique patches of circular cleared patches in the litter where they've been—a valuable clue for would-be turnicid seekers.



Barred Buttonquail, *Turnix suscitator*. Pak Chong, Nakhon Ratchasima, Thailand. © Alex Vargas.

male incubates the eggs and raises the chicks. Incubation takes only 12 to 15 days, and the extremely precocial chicks leave the nest very soon after hatching. Their first wing feathers emerge on the second day post-hatch, they are capable of competent flight by the age of two weeks, and they grow completely independent by four weeks of age. Males brood the chicks and feed them with food proffered at the bill tip for the first week, but the chicks are pretty self-maintaining after that.

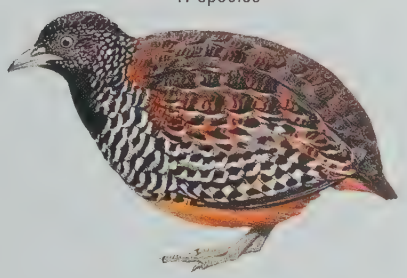
**Conservation** While most buttonquails do not face any immediate conservation concern, introduced predators and habitat destruction, through development and conversion to agriculture, have put 5 of 18 species (28%) at risk (1 NT, 1 VU, 2 EN, 1 CR (PE)). One species, the newly recognized New Caledonian Buttonquail *Turnix novaecaledoniae* is possibly extinct; it has not been documented in over 100 years.

**Relationships** Turnicidae is now thought to be included in the suborder Lari of Charadriiformes; however, morphological studies have suggested a variety of affinities for turnicids, including possible links to Otididae, Mesitornithidae, Rallidae, Columbidae, or Pteroclidae (Cracraft 1981, Livezey & Zusi 2001, Livezey & Zusi 2007). DNA-DNA hybridization studies were the first to suggest that turnicids are part of Charadriiformes (Sibley & Ahlquist 1990). More recent molecular phylogenetic studies continue to place Turnicidae within Charadriiformes, where they form a long-branch sister group to the remaining families within the Lari suborder (Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007a, Fain *et al.* 2007, Hackett *et al.* 2008).



Common Buttonquail, *Turnix sylvaticus*. Pak Chong, Nakhon Ratchasima, Thailand. © Alex Vargas.

*TURNIX*
17 species



*T. suscitator*
Barred Buttonquail

*ORTYXELOS*
1 species



*O. meiffrenii*
Quail-plover

# DROMADIDAE

Crab-plover

1 genus • 1 species

**Related Families** Glareolidae (coursers)

**Similar Birds** Thick-knees (Burhinidae), oystercatchers (Haematopodidae), avocets (Recurvirostridae), large terns (Laridae), large plovers (Charadriidae)

**Description**

- Plumage predominantly white; back, primaries, and secondaries jet black
- Wings long, pointed; tail short
- Body medium-sized, slender ovoid in shape
- Bill medium length, deep, jet-black
- Head large and rounded; neck long
- Legs long; toes short, partially webbed; legs and feet gray
- Sexes similar

**Habitat** The Crab-plover lives on tidal mudflats, sandbars, coral reeftops, and sandbanks.

**Food** As their name suggests, Crab-plovers eat mostly crabs, searching for them visually. Once they find a crab, they quickly run toward it, apprehending it with a quick stabbing motion of the bill. Small crabs are swallowed whole, whereas large crabs are shaken first to remove the legs, then broken open. Crab-plovers also take polychaetes and mollusks that are found on and just below the surface of intertidal mudflats.

**Breeding** Crab-plovers are presumed to be monogamous with biparental care. Instances in which several adults have been observed attending one nest suggest at least occasional cooperative breeding. Crab-plovers almost always nest in colonies, and they are unique among charadriiforms in constructing a burrow in sand. Burrows are typically constructed near the base of a shrub or other vegetation in flat or very slightly sloping sand banks, often not far from the high tide line, and they extend up to 2.5 m from the surface at an oblique angle that places the nest chamber about 0.5 m below the surface. A single large, pure white egg is laid in this chamber. Although the parents incubate the egg, birds are relieved of prolonged incubation activity by the ambient heat provided by the sun baking the overlying sands. Burrows maintain an optimal temperature and humidity, thus allowing adults to incubate less of the time. The chick cannot walk when it hatches, 32 to 33 days later (and possibly sooner) and it remains in the burrow until fledging, the parents bringing it food all the while. Even after fledging, the chick stays with its parents, still being fed occasionally by the parents even on the wintering grounds.

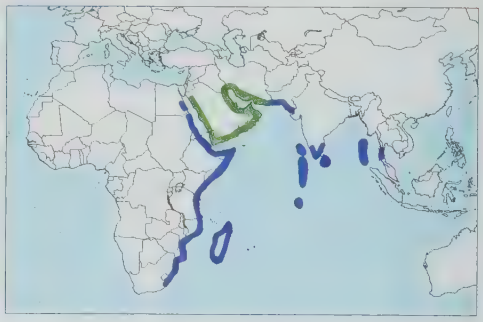
**Conservation** There are no immediate conservation concerns for the Crab-plover.

**Relationships** The Crab-plover is the sole member of its family, Dromadidae, which is part of the suborder Lari. Analyses of morphological characters tentatively placed Dromadidae in the suborder Charadrii (Cracraft 1981) or within the early radiation of the Charadriiformes (Livezey & Zusi 2007). Recent molecular phylogenetic studies, however, have instead placed Dromadidae in Lari, where it is likely sister to Glareolidae (Hackett *et al.* 2008, Pereira & Baker 2010).



Crab-plover, *Dromas ardeola*.
Sabaki River Delta, Kenya. © Piotr Jonczyk.



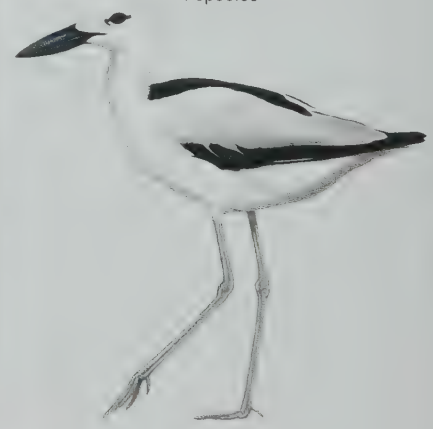


On sweltering sand flats, this slender shorebird with an over-sized bill subsists on a diet dominated by crabs. Crab-plovers aggregate into colonies of up to 1500 pairs, each of them burrowing into the sand to create shelter for a single large egg. The ambient temperatures are so high that the parents are under no great pressure to incubate, sometimes leaving the egg un-incubated for over two days at a time without obvious ill effect. Curiously, the chicks that hatch out of these eggs are less precocial than those of most charadriiforms. They cannot walk at first and generally remain in the burrow for many weeks before emerging, after which they continue to be fed by their parents for several weeks more.



Crab-plover, *Dromas ardeola*. Mida Creek Reserve, Kilifi County, Kenya. © Piotr Jonczyk.

*DROMAS*
1 species



*D. ardeola*
Crab-plover

Charadriiformes, Lari

# GLAREOLIDAE
## Coursers and Pratincoles

5 genera • 17 species

Related Families Dromadidae (Crab-plover)

Similar Birds Plains-wanderer (Pedionomidae), Egyptian Plover (Pluvianidae), plovers (Charadriidae), swallows (Hirundinidae), terns (Laridae)

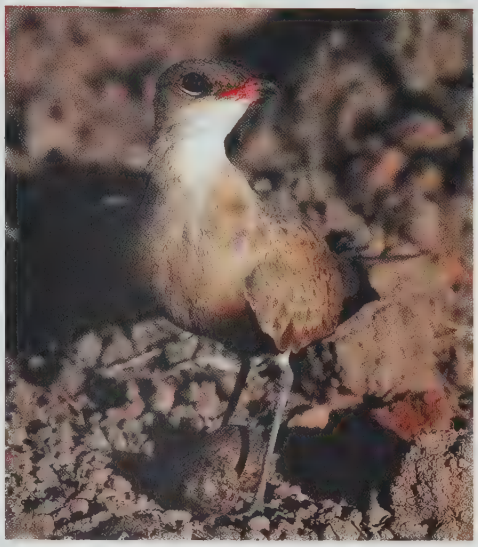
Description
- Plumage often boldly patterned, dominated by brown, gray, rufous, buff, and black
- Wings broad in coursers, long and pointed in pratincoles; tail generally short, square in coursers, forked in pratincoles
- Body medium-sized, elongate ovoid; posture upright in coursers, more horizontal in pratincoles
- Bill short to medium, tapered, and slightly decurved in coursers; short and broad in pratincoles, with a wide gape
- Head small, flat-crowned; neck thick, medium to medium-long
- Legs long in coursers, shorter in pratincoles; toes short and thick with no hallux in coursers; toes longer, with slight webbing at base of outer and middle toes, and hallux present in pratincoles
- Sexes similar

Habitats Glareolids inhabit a variety of open regions, some near water, including deserts, savanna, and farmland, at elevations from sea level up to 2000 m.

Foods The primary food of all glareolids is insects, with preference for larger insects, such as locusts, grasshoppers, and large beetles.

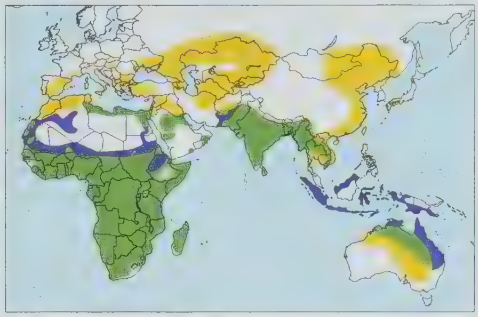
Breeding The coursers and pratincoles are monogamous with biparental care. The pratincoles often breed in colonies, sometimes containing hundreds of breeding pairs. The coursers typically nest as solitary pairs. Glareolids build a simple scrape on the ground in which they lay their eggs, in some species covering the eggs with soil when not incubating, presumably to conceal them from predators. Pratincoles lay 1 to 4 eggs, while most coursers lay 1 or 2 eggs. Both parents participate in nest construction, incubation, and feeding and protecting chicks. For the first few days after hatching, adult birds feed the chicks. After this, chicks are able to feed themselves, but nonetheless remain with the adults. Both pratincoles and coursers have distraction displays to lure predators away from chicks and nests, which include broken-wing displays in pratincoles, and mock-brooding in coursers.

Conservation Three of 17 species (18%) of



Australian Pratincole, *Stiltia isabella*.
Near Griffith, New South Wales, Australia. © Drew Fulton.





Coursers are shorebirds reminiscent of tiny bustards. Their upright posture, small head, long legs, and short toes are perfectly adapted for running through the sparsely vegetated habitats they prefer. By contrast, the pratincoles have shorter legs, partially webbed toes, a short bill with broad gape, and very long wings, making them seem like both swallows and terns in flight. They catch a large number of flying insects, but are also adept at taking prey from the ground, like their courser cousins, with the run-and-stop cadence of a plover. The plumages of both are dominated by earth tones, often punctuated with black around the face and neck.



Double-banded Courser, *Smutsornis africanus*. Aledeghe Plains, Ethiopia. © Luke Seitz.

glareolids face some conservation concern (1 NT, 1 VU, 1 CR). The critically endangered Jerdon's Courser *Rhinoptilus bitorquatus*, long thought to be extinct, was rediscovered in 1986, but is still rare and declining in thorny scrub forests of southern India, with an estimated population between 50 and 249 mature individuals. Other species of glareolids have declined largely as a result of habitat destruction and alteration.

Relationships Glareolidae is part of the suborder Lari, and several studies suggest it is sister to the remaining Lari save for Turnicidae (Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007). None of these studies included Dromadidae in their sampling, and the one recent study (Pereira & Baker 2010) that did so indicated, as did the earlier work of Sibley & Ahlquist (1990), that Glareolidae is sister to Dromadidae, and that these together are sister to the rest of the Lari minus Turnicidae. The Egyptian Plover *Pluvianus aegyptius* was long thought to belong in Glareolidae, but several molecular phylogenetic studies have found that it represents an old lineage with no close living relatives (Baker *et al.* 2007a, Fain & Houde 2007) but closest affinities with Charadrii, and it is now placed within its own separate family there. Two well-defined subfamilies of coursers and pratincoles have often been recognized within Glareolidae, and they were long considered separate families. These groups would be paraphyletic, however, as the *Rhinoptilus* coursers appear to be sister to the rest of the family (Baker *et al.* 2007a).



Little Pratincole, *Glareola lactea*. National Chambal Sanctuary, Madhya Pradesh, India. © Kevin Schafer.



Charadriiformes, Lari

# LARIDAE
## Gulls, Terns and Skimmers

21 genera • 101 species

**Related Families** Stercorariidae (skuas and jaegers), Alcidae (auks)

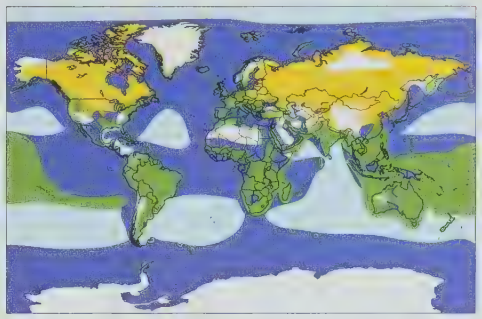
**Similar Birds** Skuas (Stercorariidae), shearwaters and petrels (Procellariidae), sheathbills (Chionidae)

**Description**
- Plumage typically black or gray above and white below
- Wings usually long, pointed; tail square or forked, variable in length from short to long
- Body size generally medium to large in gulls, small to medium in terns, medium in skimmers; shape generally ovoid, more elongate in terns and skimmers
- Bill usually with prominent angle at gonys and with slightly hooked tip in gulls; fairly long and slender in terns; long, laterally compressed in skimmers, with lower bill longer than upper
- Head slightly elongate; neck typically medium length, thick
- Legs short in terms and skimmers, longer in gulls; feet webbed; hallux small
- Sexes generally similar; males typically larger than females



White-winged Tern, *Chlidonias leucopterus*. Biebrza, Poland. © Paweł Wacławik.





**Habitat** Larids occupy a wider range of habitats than the colloquial name "seagull" would suggest. While most species live in coastal areas, some are deep-ocean pelagic species for most of the year and others live far inland, mostly near water but also in some extremely xeric environments that are within a daily commute to water. Gulls are most diverse in the temperate zone, occupying the greatest range of habitats there, from pack ice to alpine tarns, and from city parks to agricultural fields. Terns and skimmers are most diverse in the tropics, and there they occupy all aquatic habitats, from remote ocean very far from land to coastal lagoons and rivers.

**Food** Gulls feed on a wide variety of items, especially crustaceans and insects as well as fish, mammals, and birds. They will eat their prey alive or dead, with many taking advantage of mammal, bird, and fish carcasses, and the larger gulls are effective predators, not only on eggs and chicks, but also on adult birds of considerable size. Although gulls are largely diurnal, one species, the Swallow-tailed Gull *Creagrus furcatus*, is highly specialized and forages at night on squid. Most terns feed primarily on fish and aquatic invertebrates that are caught by plunge-diving into the water. Skimmers have a highly specialized mode

The Laridae are the most familiar charadriiform birds of every shore. Active, obvious, and seldom shy, they are sometimes in our lives even more than we would like. They can be divided by what they eat: Gulls generally eat any animal they can swallow, dead or alive, and they gather their food with an astonishing opportunism and ingenuity; terns mostly eat fish that they dive for, and they stay out of each other's way in loose foraging aggregations; and skimmers use their highly specialized bills to snag their prey from the surface of calm water, often in gracefully coordinated bands. Larids lay their eggs on sandy beaches, atop precarious cliff ledges, and even in trees, and the precocial young are fed at home until they fledge.



Roseate Tern, *Sterna dougallii*. Plymouth Beach, Massachusetts. © Ian Davies.

of feeding, flying steadily low over still waters, skimming their elongated lower bill in the water and snapping up any small fish or crustaceans that touch it.

Breeding Most larid species are colonial or semi-colonial; the need for nesting areas relatively free of vegetation and protected from predators (usually on islands) means nesting space is usually limited and breeding areas are crowded. A very small territory around the nest is defended against conspecifics, which, in gulls, are one of the greatest threats to successful nesting. Most colonies are defended by group defense, and potential predators in the colony are met with aggressive dive-bombing, including alarm-calling and defecating upon and striking the intruder. Most species nest on the ground, with nests consisting of simple scrapes, filled, in most gulls species, with a loose nest of twigs, grass, and feathers. Some species nest on cliff ledges and in niches in rock or on floating mats of marsh vegetation. Others nest in trees; female white terns (*Gygis*) uniquely balance their single eggs on a sturdy branch in a tree with no nest at all. Larids are monogamous, with both parents assisting in incubation and chick provisioning. The precocial chicks hatch after 19 to 40 days of incubation and are generally capable of their own thermoregulation after the first few days, but they must be fed by their parents all the way up to leaving the colony four to six weeks after hatching.

Conservation While many gull species are extremely abundant, 22 species (nearly 22%) of larids face some conservation concern (11 NT, 6 VU, 4 EN, 1 CR). The critically endangered Chinese Crested Tern *Thalasseus bernsteini* numbers at most 40 mature adults spread between two colonies, and continues to decline as a result of habitat loss and egg collection. Many other declining species of gulls and terns are the victims of habitat destruction and degradation. The Ivory Gull *Pagophila eburnea*, a distinctive symbol of the high Arctic, appears to be experiencing rapid population declines, and these declines are likely associated with rapidly disappearing sea ice. It may well be that the Ivory Gull will be one of the first victims of global climate change.



Brown Noddy, *Anous stolidus*. Bush Key, Dry Tortugas NP, Florida, USA. © Drew Fulton.

Relationships Laridae is part of the suborder Lari of Charadriiformes. Recent molecular phylogenetic studies suggest that, within Lari, Laridae appears to be sister to the clade containing Stercorariidae and Alcidae (Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010). The limits of the family Laridae have varied substantially over the years, from encompassing the gulls, terns, skimmers, and skuas to the other extreme of separating out all of these groups into their own respective families. This latter approach would be attractive, as the diversity of ecology and morphology in this family is considerable. The most recent study of the group found the tern genera *Anous* and *Gygis* to be sister to both gulls and the other terns (Baker *et al.* 2007a), but this contrasted with other studies that instead recovered a monophyletic tern clade (Bridge *et al.* 2005, Pons *et al.* 2005). The relationship of skimmers (*Rynchops*) to the rest of Laridae has also differed across studies, with the skimmers variously appearing as sister to the gulls (Baker *et al.* 2007a, Pereira & Baker 2010), to terns (Paton & Baker 2006, Fain & Houde 2007), or to both gulls and terns (Sibley & Ahlquist 1990, Ericson *et al.* 2003a). Further study will no doubt clarify these relationships, but it seems preferable for now to retain each of the clades that have been recognized recently as separate subfamilies here.



Lava Gull, *Larus fuliginosus*. Genovesa Island, Galapagos. © Shawn M. Billerman

## Subfamily ANOINAE

*ANOUS*
3 species

*A. stolidus*
Brown Noddy

*PROCELSTERNA*
2 species

*P. cerulea*
Blue Noddy

## Subfamily GYGINAE

*GYGIS*
2 species

*G. alba*
Common White Tern

## Subfamily RYNCHOPINAE

*RYNCHOPS*
3 species

*R. niger*
Black Skimmer

## Subfamily LARINAE

*SAUNDERSILARUS*
1 species

*S. saundersi*
Saunders's Gull

*HYDROCOLOEUS*
1 species

*H. minutus*
Little Gull

*RHODOSTETHIA*
1 species

*R. rosea*
Ross's Gull

*CREAGRUS*
1 species

*C. furcatus*
Swallow-tailed Gull

*XEMA*
1 species

*X. sabini*
Sabine's Gull

*PAGOPHILA*
1 species

*P. eburnea*
Ivory Gull

*RISSA*
2 species

*R. tridactyla*
Black-legged Kittiwake

*LARUS*
44 species

*L. argentatus*
European Herring Gull

## Subfamily STERNINAE

*ONYCHOPRION*
4 species

*O. fuscatus*
Sooty Tern

*STERNULA*
7 species

*S. albifrons*
Little Tern

*PHAETUSA*
1 species

*P. simplex*
Large-billed Tern

*GELOCHELIDON*
2 species

*G. nilotica*
Common Gull-billed Tern

*HYDROPROGNE*
1 species

*H. caspia*
Caspian Tern

*LAROSTERNA*
1 species

*L. inca*
Inca Tern

*CHLIDONIAS*
4 species

*C. hybrida*
Whiskered Tern

*STERNA*
13 species

*S. hirundo*
Common Tern

*THALASSEUS*
6 species

*T. bergii*
Greater Crested Tern

# STERCORARIIDAE
## Skuas and Jaegers

2 genera • 7 species

**Related Families** Alcidae (auks)

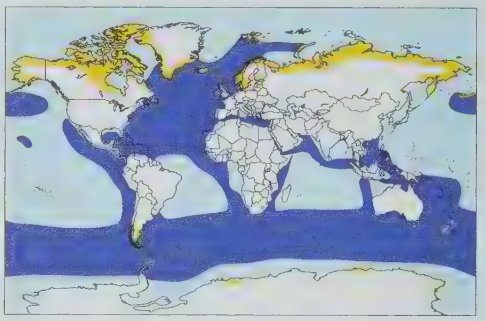
**Similar Birds** Gulls and terns (Laridae), petrels (Procellariidae),

**Description**
- Plumage mainly dark brown, with white and pale yellow on the breast and belly in jaegers; all species with distinctive white patch at the base of the primaries
- Wings long, pointed, falcon-like in jaegers, deeper and more *Buteo*-like in skuas; tail with extended central rectrices in jaegers
- Body medium-sized, ovoid; quite slim and elongate in smaller jaegers, increasingly robust and barrel-chested in larger species
- Bill with prominent angle at gonys; tip slightly hooked in jaegers, strongly so in skuas
- Head small to medium; neck medium-short and thick
- Legs of medium length; feet webbed; toes with large claws
- Females larger than males; sexes otherwise similar



Pomarine Jaeger, *Stercorarius pomarinus*. Barrow, Alaska, USA. © D. W. Winkler.





**Habitat** During the breeding season, skuas and jaegers nest on tundra or on open grassy or bare-rock areas on islands. Outside the breeding season, most species spend most of their time at sea out of sight of land.

**Food** Stercorariids have a varied diet of animal prey, opportunistically hunting, scavenging, or kleptoparasitizing. During the breeding season, some species feed more on fish than others, while some eat a great many lemmings, and others eat mostly eggs and chicks of other species. But during the non-breeding season their diet is mostly fish, which they either catch themselves or steal from other birds.

**Breeding** Skuas and jaegers are mostly monogamous with biparental care. Some populations of Brown Skua *Catharacta antarctica* exhibit cooperative polyandry, with one female breeding with multiple (typically two, but sometimes up to six) males. In these polyandrous groups, only a single nest is tended, and all the males associating with the female assist in territory defense, incubation, and feeding chicks. Stercorariid nests are simple structures, consisting of a small scrape or depression on the ground in which females lay 1 or 2 eggs. Location of the nest varies with species, and may be on bare rock or on tundra-like ground with vegetative cover

As their common name suggests ("jaeger" is German for hunter), these birds with strong hooked bills are raptorial birds of the open sea. Jaegers and skuas are relentless predators and pirates, terrorizing other seabirds in the vicinity by taking their eggs and chicks or stealing their captured prey. At their own nests, however, jaegers are model parents, protecting their young with a combination of attacks and distraction displays and feeding them a rich diet of smaller vertebrates throughout their nestling life. Like raptors, female skuas and jaegers are larger, and some skuas commonly form breeding associations of one female and two males (or more) raising the same brood together.



Long-tailed Jaeger, *Stercorarius longicaudus*. Council Road, Nome, Alaska, USA. © Ian Davies.

limited to small bushes and grass. Both parents participate in nest construction (by trampling the ground to create a depression), incubation, feeding chicks, and territory defense. Parents regurgitate food for the chicks or tear off pieces of prey for them. The precocial chicks hatch after 24 to 32 days of incubation, and they stay near the nest, where they are fed until they fledge after 24 to 50 days.

Conservation No species of jaegers or skuas face immediate conservation concerns.

Relationships Stercorariidae is part of the suborder Lari of Charadriiformes. Although most morphological studies group these birds with the gulls in an expanded Laridae (Craraft 1981, Chu *et al.* 2009), the classification of Stercorariidae has varied. One molecular phylogenetic study based on mitochondrial DNA found gulls and jaegers to be sister groups (Cohen *et al.* 1997), whereas more recent analyses of more extensive molecular datasets have suggested instead that Stercorariidae is sister to Alcidae (Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010). At least one recent morphological study (Mayr 2011) supported this hypothesis, with some skeletal features, including skull characters, suggesting the same sister relationship.

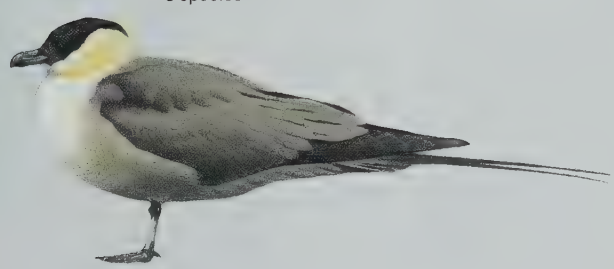


South Polar Skua, *Catharacta maccormicki*. Trinity Island, Antarctica. © Kevin Schafer.



Long-tailed Jaeger, *Stercorarius longicaudus*. Canning River Delta, Arctic National Wildlife Refuge, Alaska, USA. © Ian Davies.

*STERCORARIUS*
3 species



*S. longicaudus*
Long-tailed Jaeger

*CATHARACTA*
4 species



*C. antarctica*
Brown Skua

# ALCIDAE
## Auks

10 genera • 24 species

**Related Families** Stercorariidae (skuas and jaegers)

**Similar Birds** Penguins (Spheniscidae), diving-petrels (Procellariidae)

**Description**
- Plumage typically dark gray or black on upperparts and white below; some species cryptically patterned with brown in breeding plumage, others with elaborate facial plumes
- Wings narrow and pointed; tail short
- Body small to medium, ovoid
- Bill often laterally compressed, colorful and enlarged during the breeding season
- Head large; neck medium-short
- Legs short, set back on body; feet webbed, with long claws
- Sexes similar; males usually slightly heavier

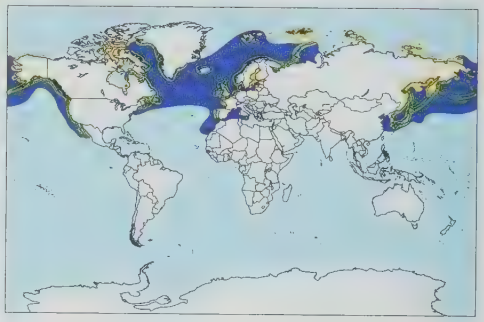
**Habitat** Alcids nest on rocky Arctic and north temperate shorelines. All of them are totally marine in the non-breeding season.

**Food** Alcids feed on marine animals, from zooplankton to squid and small fish, seized in the bill during underwater dives.



Tufted Puffin, *Fratercula cirrhata*.
Verkhoturov Island, Russia. © Benjamin Van Doren.





These exclusively marine, wing-propelled divers are as agile at sea as they are clumsy on land, and they are fast, direct fliers once they become airborne. The young of different species leave the nest at very different ages depending on the relative safety and food supply near the nest, and those that leave the nest at a young age can undergo the majority of their development at sea, far from land, under the watchful care of a lone parent. Alcids have an enchanting diversity of courtship signals, with facial plumes, large and brightly colored bills, and even olfactory cues, yet in none of the species are males and females differentially adorned.

**Breeding** Alcids are monogamous with biparental care. Most species nest colonially, although some, like the *Brachyramphus* murrelets, are solitary nesters. Most alcids nest on the ground, often in a cavity or rock crevice. Some species, including puffins and some murrelets and auklets, dig their own nest burrows. Others, like the murres, nest on steep cliffs with narrow ledges, where the near-conical shape of their eggs appears to protect them from rolling off. The nest itself is usually minimal or nonexistent. Marbled Murrelets *Brachyramphus marmoratus* and the closely related Long-billed Murrelet *B. perdix* often nest on wide horizontal boughs high in old-growth conifers. There they build an atypically substantial nest of sticks and moss. Alcids lay only 1 or 2 eggs. Both male and female are active in nest construction, and both sexes incubate and care for the young. The chicks hatch after an incubation period that varies among species from 27 to 46 days. Though the chicks are precocial, those of some species leave the nest very early and others remain in the nest until they fledge. The timing of nest-leaving appears to have much to do with the distribution of available food. Chicks that stay in the nest until fledging are fed from food sources relatively near the nest; in species that leave the nest early they are essentially escorted to the food supply by a parent and fed there, on rich local food, until they become independent. Thus, within a day or two of hatching, Kittlitz's Murrelets *Brachyramphus brevirostris* can trek several kilometers down through talus slopes to enter the water with a parent and swim far offshore to be fed and attended. Similarly, three-week-old murre chicks flutter on half-grown wings down from their cliff nests, crashing on the rocky shore and bouncing and crawling into the water, to make a similar trip up to 50 km offshore to finish development attended by a parent.



Atlantic Puffin, *Fratercula arctica*. Isle of May, Scotland. © Santiago Imberti.

**Conservation** Many alcid species are declining because of habitat destruction, introduction of mammalian predators to breeding islands, and diminished food resources resulting from overfishing and climate change. Seven species (29%) are currently at risk (2 NT, 3 VU, 2 EN). Within the last 200 years the Great Auk *Pinguinus impennis*, a large, flightless alcid of the North Atlantic, was hunted to extinction for its meat, feathers, fat, and oil.

**Relationships** Alcidae is part of the suborder Lari of the order Charadriiformes. A recent phylogeny based on morphological characters found Alcidae to be sister to a group that contains skuas and terns (Livezey & Zusi 2007), and another refined that hypothesis further to suggest a possible sister relationship with Stercorariidae (Mayr 2011). Many studies based on DNA sequence data consistently place the alcids sister only to Stercorariidae, forming a group that is in turn sister to Laridae (Ericson *et al.* 2003a, Paton & Baker 2006, Baker *et al.* 2007a, Fain & Houde 2007, Pereira & Baker 2010). Within Alcidae, there appear to be two clades, recognized here as subfamilies Aethiinae and Alcinae (Friesen *et al.* 1996, Pereira & Baker 2008).



Cassin's Auklet, *Ptychoramphus aleuticus*. Pacific Ocean off southern California, USA. © Tom Johnson.

## Subfamily **AETHIINAE**

*CERORHINCA*
1 species



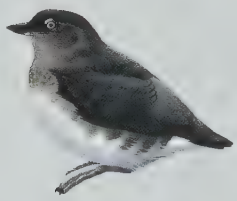
*C. monocerata*
Rhinoceros Auklet

*FRATERCULA*
3 species



*F. arctica*
Atlantic Puffin

*PTYCHORAMPHUS*
1 species



*P. aleuticus*
Cassin's Auklet

*AETHIA*
4 species



*A. cristatella*
Crested Auklet

## Subfamily **ALCINAE**

*BRACHYRAMPHUS*
3 species



*B. marmoratus*
Marbled Murrelet

*CEPPHUS*
3 species



*C. grylle*
Black Guillemot

*SYNTHLIBORAMPHUS*
5 species



*S. wumizusume*
Japanese Murrelet

*ALCA*
1 species



*A. torda*
Razorbill

*ALLE*
1 species



*A. alle*
Little Auk

*URIA*
2 species

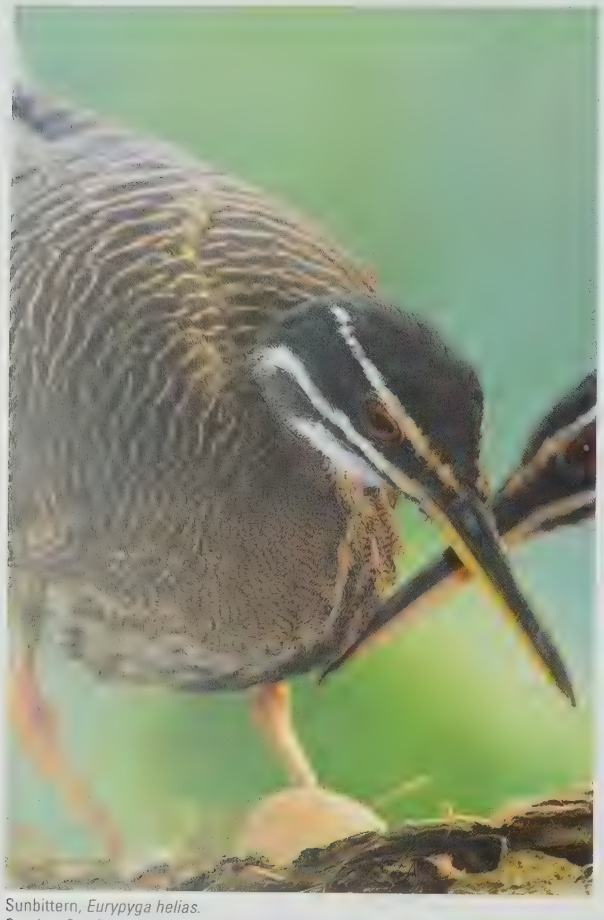


*U. lomvia*
Thick-billed Murre

# Order: EURYPYGIFORMES

## Families: Rhynochetidae, Eurypygidae

The two bird species in this order, the Sunbittern and Kagu, were long placed in Gruiformes, but recent genetic studies indicate instead that they are not closely related at all to the other gruiforms and are sister taxa (Ericson *et al.* 2006a, Hackett *et al.* 2008). Placing Rhynochetidae and Eurypygidae together in Eurypygiformes brings together two families on either side of the Pacific Ocean. The placement of this ancient and low-diversity order within the broader avian tree remains uncertain, although it may have closest affinities to Caprimulgiformes (Fain & Houde 2004, Ericson *et al.* 2006a, Hackett *et al.* 2008) or to Phaethontiformes (McCormack *et al.* 2013, Jarvis *et al.* 2014).



Sunbittern, *Eurypyga helias*.
Captive, San Diego Wild Animal Park, USA. © Mark A. Chappell.



Kagu, *Rhynochetos jubatus*.
Blue River NP, New Caledonia. © Nick Athanas.

Eurypygiformes

# RHYNOCHETIDAE
## Kagu

1 genus • 1 species

**Related Families** Eurypygidae (Sunbittern)

**Similar Birds** Rails (Rallidae), pheasants (Phasianidae), pittas (Pittidae), night-herons (Ardeidae)

**Description**
- Loose, pale gray plumage
- Flightless, but with broad wings with barred pattern in chestnut and black; tail short
- Body medium-sized, thick-set ovoid
- Bill red, medium-long, stout, slightly drooping
- Head large, with very long erectile crest
- Legs and feet red, sturdy, and long
- Females with bolder wing pattern than males

**Habitat** The Kagu occurs in forest and shrubland on the island of New Caledonia.

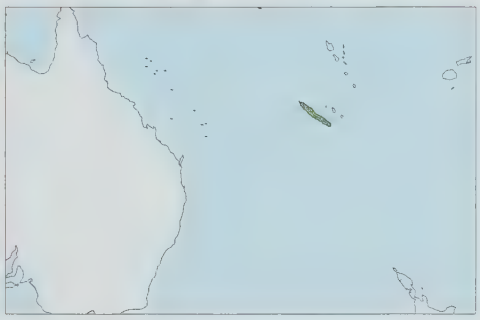
**Food** Being flightless, the Kagu is entirely terrestrial, and uses its stout bill to forage in the leaf litter and soil. The Kagu is almost exclusively carnivorous, feeding mostly on small invertebrates such as insects and other arthropods, snails, and earthworms. It is thought that its hunting is aided by an acute sense of hearing.

**Breeding** Kagus are monogamous breeders with long-term pair bonds; they often breed cooperatively, with fledglings from previous breeding episodes retained as helpers. Kagus lay only a single egg in a simple nest on the ground that is little more than a scrape in the leaf litter. A replacement clutch will be laid if the first egg or chick is lost. Only the breeding pair cares directly for the egg and chick. Both parents incubate the egg, each taking roughly equal shifts over an incubation period that stretches 33 to 37 days. The chick is brooded at night and is fed for up to 14 weeks after hatching. The chick will remain on the territory of its parents for up to six years. The non-breeding members of the family group help in territory defense, but they are usually chased away from the nest or young chick if they get too close.



Kagu, *Rhynochetos jubatus*.
Blue River NP, New Caledonia. © Nick Athanas.





This flightless endemic of New Caledonia grabs invertebrates from the litter or probes for them in the soil in wet forests. When foraging, the Kagu jogs along, then suddenly stops and peers (and listens?) for many seconds, often with one foot poised in mid-air, before jabbing at the substrate with its strong bill or jogging on for another meter or so. The most striking part of its silver-gray plumage is a very long lax crest, which is erected expressively in interactions with the extended family-group members with which it lives. When alarmed it flares its wings to reveal a striking barred pattern of chestnut, black, and white, a display highly reminiscent of its cousin the Sunbittern.

**Conservation** Originally affected by subsistence hunting, the Kagu population declined greatly after European colonization, owing to continued hunting, habitat destruction, disease, and introduced mammals, such as dogs, cats, and pigs. Although its population appears to number no more than 1,000 individuals, intensive management has led to its stabilization, but threats to the Kagu still persist in unmanaged sites (1 EN).

**Relationships** The newly discovered sister relationship between the Kagu and the Sunbittern has interesting biogeographic implications: fossil evidence suggests that an extinct group of birds from New Zealand—the adzebills (Aptornithidae)—is sister to the Kagu (Livezey & Zusi 2001, Livezey & Zusi 2007). This might suggest that this entire group originated on the ancient supercontinent of Gondwana.



Kagu, *Rhynochetos jubatus*. Parc des Grandes Fougères, New Caledonia. © Yuji Okahisa.

*RHYNOCHETOS*
1 species



*R. jubatus*
Kagu

Eurypygiformes

## EURYPYGIDAE
### Sunbittern

1 genus • 1 species

Related Families Rhynochetidae (Kagu)

Similar Birds Finfoots (Heliornithidae), bitterns (Ardeidae), woodrails (Rallidae)

Description
- Brown plumage, heavily barred with black above, two white stripes on black face
- Wings medium length and broad, with bright pattern in primaries; tail long, broad, barred
- Body medium-sized, elongate ovoid, typically held horizontal
- Bill long and slender
- Head small; neck long, very slender
- Legs and toes long
- Sexes similar

Habitat Sunbitterns inhabit the edges of lowland Neotropical fresh waters that provide a muddy bank along which they forage, usually with forest cover nearby.

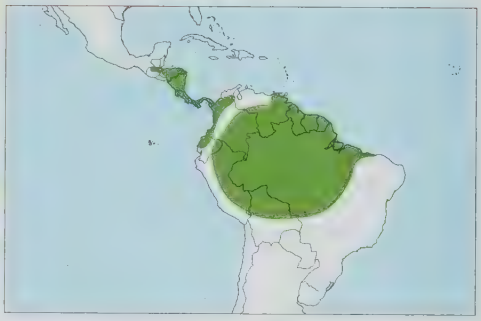
Food Sunbitterns eat most any animal small enough for them to subdue and swallow, including aquatic insect larvae, crustaceans, snails, worms, and adult insects, as well as fish, frogs, and lizards.

Breeding Sunbitterns are monogamous with biparental care. They nest in trees, on large horizontal branches, where they build an open, cup/platform nest of grasses and leaves reinforced with mud and often lined with rootlets and leaves. The nest location is typically open, rather than hidden. Females typically lay 1 or 2 eggs. Both parents take part in nest-building, incubation, and feeding the chicks, though one parent occasionally leaves the other to finish up parental duties solo partway through the nesting attempt. The chicks hatch after 29 to 30 days of incubation and remain in the nest for three to four weeks, remaining with the parents after leaving the nest and gradually gaining independence about two months after hatching. Sunbitterns exhibit strong defensive behavior around the nest and the chicks, using a frontal display of their patterned wings to chase off potential predators.



Sunbittern, *Eurypyga helias*.
Pousada Rio Claro, Matto Grosso, Brazil. © D. W. Winkler.





Conservation The Sunbittern faces no immediate threats.

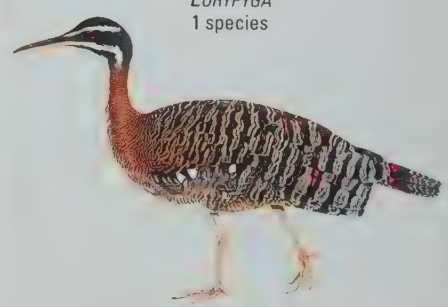
Relationships The Sunbittern was long placed in Gruiformes, but recent genetic studies indicate instead that it is not closely related to the core Gruiformes. Instead, Eurypygidae is sister to another ancient avian lineage, Rhynochetidae, and these two families together now form Eurypygiformes.

The Sunbittern is a heron-like denizen of wooded streams and marshes in the Neotropics, raising its young in an arboreal nest. It pursues its insect and vertebrate prey in a steady and unhurried inspection of waterside substrate and vegetation. Its neck is very thin, and, more than most birds, its body seems to serve as a stable horizontal platform from which its small skull and narrow bill can be thrust at almost any angle, at any edible animal it encounters. When alarmed, the Sunbittern is quick to flash open its wings and tail, revealing, like the startle display of an enormous underwing moth, the striking gold, red, black, and silver pattern that gives it its name.



Sunbittern, *Eurypyga helias*. Hato el Cedral, Caracas, Venezuela. © Ph Moës.

*EURYPYGA*
1 species



*E. helias*
Sunbittern

# Order: PHAETHONTIFORMES

## PHAETHONTIDAE
Tropicbirds

1 genus • 3 species

**Related Families** Relationships not well resolved; recent work suggests a closest relationship with Eurypygiformes (Sunbittern and Kagu).

**Similar Birds** Terns (Laridae)

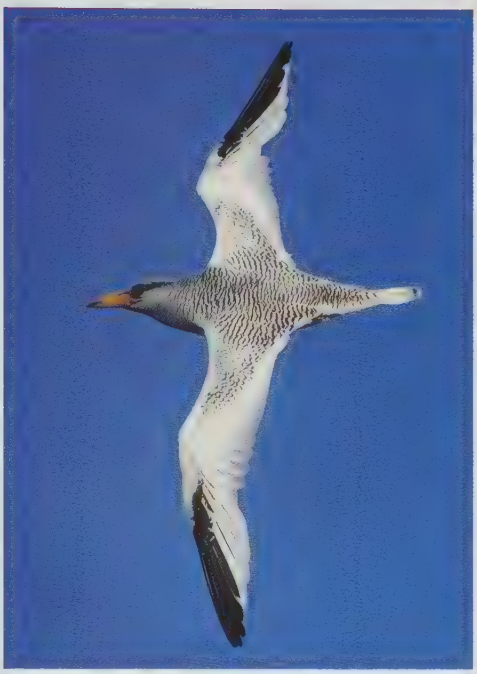
**Description**
- White plumage with black in wings and head
- Wings long and pointed; adults of all species with long, flowing tail (composed of the two central tail feathers), which can equal the length of the rest of the bird
- Body cylindrical fusiform
- Bill medium length, pointed, and decurved, with finely and irregularly serrated cutting edge
- Head medium-sized; neck short
- Legs short; feet small, totipalmate
- Sexes similar

**Habitat** Tropicbirds live in tropical or subtropical oceans throughout the year. They breed on remote, isolated oceanic islands, often in very inaccessible places.

**Food** Tropicbirds feed on fish and aquatic invertebrates. Their preferred foods are flying fish and squid. Tropicbirds catch their food primarily by plunge-diving, much as terns do.

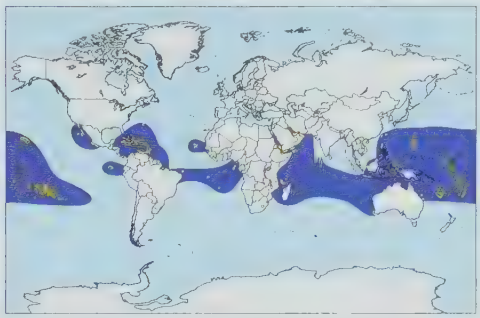
**Breeding** Tropicbirds presumably are monogamous, and large group courtship displays are followed by acrobatic chases and aerial dances of pairs that break off from the group to mate. Because tropicbirds nest in tropical seas where food shows little seasonality, their nesting seasons are extended and variable from place to place. Tropicbirds lay their single-egg clutch directly on the bare ground (often concealed by grass or bushes) or in a narrow crevice between rocks. Both parents incubate the egg, for a period of 40 to 46 days, and feed the chick, which will be brooded for only the first few days after hatching. It is fed in the nest by both parents for 70 to 90 days. Once the chick has fledged, it takes another two or three years to achieve sexual maturity.

**Conservation** None of the three species of tropicbirds face any immediate conservation concerns.



Red-billed Tropicbird, *Phaethon aethereus*. Dogbody Canyon area, Atlantic Ocean offshore Massachusetts, USA. © Ian Davies.



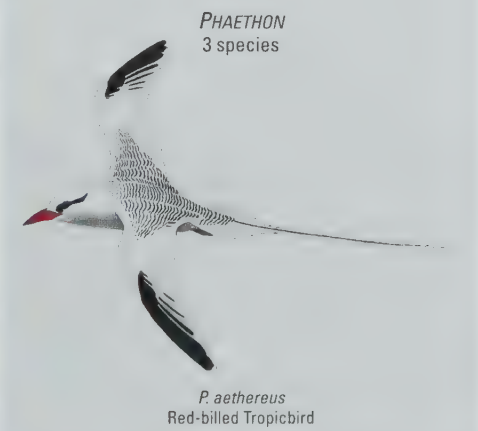


Tropicbirds are elegant white birds of tropical seas, with long central tail feathers that stream behind them, lending their passage a grace that few birds can match. Though ungainly in the extreme on land, these birds are aerial acrobats, whether they are dodging the thievery of frigatebirds or performing the remarkable "back-pedaling" of a courtship display. Most often breeding on isolated oceanic islands, these are true pelagic birds, and they spend the vast majority of their time wandering the oceans in search of flying fish and squid. These they catch from the side, a habit that is likely made more effective by the fine serrations on their bills.

**Relationships** Although tropicbirds were long placed in Pelecaniformes (Cracraft 1981, Kennedy & Spencer 2004, Clements 2007) on the basis of shared anatomical features (totipalmate feet, bare gular area), genetic evidence now shows convincingly that the tropicbirds are not closely related to any of the Pelecaniformes (van Tuinen *et al.* 2001, Kennedy & Spencer 2004, Ericson *et al.* 2006a, Hackett *et al.* 2008, Jarvis *et al.* 2014). Their placement within the broader avian tree remains uncertain, with different studies suggesting relationships with Podicipediformes, Phoenicopteriformes, Columbiformes, Pterocliformes, or Mesitornithiformes (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008), or, more recently, with Eurypygiformes (Jarvis *et al.* 2014). As no close relationships can be determined with confidence, and under any scenario they represent an ancient lineage, they now represent the sole family in Phaethontiformes, with their affinities in our order of presentation tentatively closest to Eurypygiformes.



White-tailed Tropicbird, *Phaethon lepturus*. Atlantic Ocean offshore North Carolina, USA. © Tom Johnson.



# Order: GAVIIFORMES

## GAVIIDAE
Loons

1 genus • 5 species

**Related Families** Spheniscidae (penguins), Procellariiformes (tubenoses, four families)

**Similar Birds** Grebes (Podicipedidae), ducks (Anatidae), cormorants (Phalacrocoracidae)

**Description**
- Plumage dense, predominantly black or gray above, white below
- Wings narrow; tail very short
- Body medium-sized, streamlined fusiform, almost always held horizontal on water surface
- Bill medium length, straight, pointed, and dagger-like
- Head slightly elongated; neck thick
- Legs short, robust, and set far back on body; feet with first three toes webbed; feet and legs flattened for slim cross-section
- Sexes similar

**Habitat** Most loons nest on Arctic and subarctic ponds and lakes, with one species (*Gavia immer*) nesting on large lakes surrounded by boreal forest. They winter in coastal waters or on very large lakes.

**Food** Adult loons feed primarily on fish with some amphibians and aquatic invertebrates. Newly hatched young are fed aquatic arthropods before small fish are introduced.

**Breeding** Loons are socially monogamous with biparental care. Loon nests vary in form, not only among species but within as well. The two primary nest types consist of aquatic vegetation placed on dry land or a nesting platform in shallow water, built by piling mud and aquatic vegetation until it sits just above the water line. Female loons usually lay 2 eggs, and both parents share in nest construction, incubation, and provisioning of the young. After about a month of incubation, the precocial chicks hatch and remain in the nest for a few days, but soon join their parents in open lake waters, either swimming along or riding on the back of one of the parents while the other dives for food. By about three weeks of age, they begin feeding themselves, but they are still fed occasionally by their parents even after they can fly at about seven to nine weeks of age.



Pacific Loon, *Gavia pacifica*.
Churchill, Manitoba, Canada. © Andy Johnson.



Torpedo-like piscivores of cold northern waters, these sleek foot-propelled divers have feet with traditional webs, but flattened for a knife-like upstroke and placed far back on the body to generate a powerful downstroke. Loons are so adapted to their aquatic lifestyle that they cannot really walk on land, instead tobogganing their bodies to and from a nest that is at most a body's length from water. Soon after hatching, the fluff-ball chicks join their parents on the open water, accompanying them as they forage for the family. The young will continue to be fed until they acquire the dense velvety plumage they will have as adults.

**Conservation** Although loons have disappeared from some breeding lakes because of acid rain and pollution, only one species (20%) is at risk (1 NT). The population of the Yellow-billed Loon *G. adamsii* is declining from subsistence hunting, and the species is at risk in parts of its range from oil development, heavy-metal poisoning, and drowning in fishing nets.

**Relationships** Largely on the basis of skeletal anatomy, Gaviiformes had long been thought to be allied to Podicipediformes, Procellariiformes, or Sphenisciformes. Anatomical characters and interpretations of fossil evidence have suggested a sister relationship between Gaviiformes and Podicipediformes (Cracraft 1981). However, molecular phylogenetic studies suggest that the loons are not at all closely related to the grebes and that the morphological similarities of these families are due to convergence. The loons are instead more closely related to groups within a large "waterbird clade" that includes Procellariiformes and Sphenisciformes (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008), or these two groups plus Pelecaniformes, Suliformes, and Ciconiiformes (Jarvis *et al.* 2014).



Pacific Loon, *Gavia pacifica*. Bolsa Chica Ecological Reserve, California, USA. © Mark A. Chappell.

*GAVIA*
5 species



*G. adamsii*
Yellow-billed Loon

# Order: SPHENISCIFORMES

## SPHENISCIDAE
Penguins

6 genera · 18 species

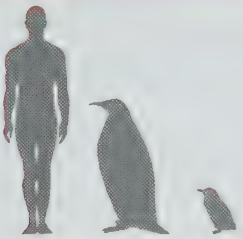
**Related Families** Procellariidae (petrels), Diomedeidae (albatrosses), Hydrobatidae (northern storm-petrels), Oceanitidae (southern storm-petrels)

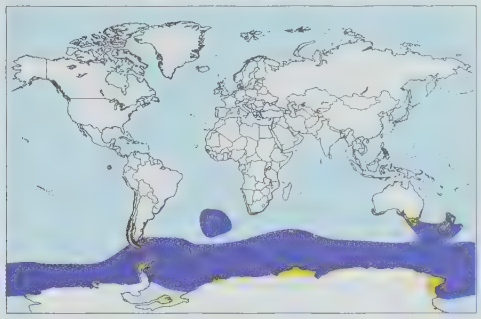
**Similar Birds** Auks (Alcidae)

**Description**
- Plumage extremely dense, waterproof, typically black with white underparts, some species with patches of yellow or orange, no or very small apteria
- Wings are paddle-like with scaly remiges, incapable of folding or generating significant lift in air; tail short
- Body small to large, cylindrical ovoid, typically with upright carriage
- Bill variable in length, but generally stout and laterally compressed
- Head small to medium, robust; neck short, thick
- Legs very thick, short; feet with short thick toes and claws
- Sexes similar



Gentoo Penguin, *Pygoscelis papua*.
Petermann Island, Antarctic Peninsula. © Santiago Imberti.





**Habitat** Penguins are strictly tied to marine environments with cold ocean waters. They nest close to the ocean, on shoreline rocks, ice, in temperate rainforest, or on steep rocky hillsides.

**Food** Penguins feed primarily on fish but will take a variety of marine organisms, ranging from squid to crustaceans, especially krill. Main fish prey are smaller, shoaling species, such as herring and notothenid icefish. The smaller southern species take a higher proportion of krill, whereas the larger southern species and the more northern species take more fish and squid. *Aptenodytes* species regularly dive to depths greater than 100 m in search of prey, and other species forage in flocks, sometimes in association with seals, cormorants, or gannets.

**Breeding** Penguins are monogamous with biparental care. All species of penguins but *Megadyptes* are colonial nesters, with colonies exceeding several thousand pairs in many species. The nests of penguins vary from no nest at all, with the egg being incubated on the father's feet, to burrows, to nests in rock crevices. Many nests are lined simply with stones, but others include some feathers and vegetative material. *Aptenodytes* species lay a single-egg clutch, but 2 eggs is the norm for all the others. In most species, both parents share in all aspects of parental care, but male Emperor Penguins *Aptenodytes forsteri* are responsible for all incubation. In *Aptenodytes*, the chicks are so large that they cannot be reared in a single southern breeding season: incubation in *A. forsteri* spans the winter months, when the exhausted female is at sea feeding, leaving the entire Antarctic sum-

Perhaps no birds have a real nature so at odds with the way most people think of them. Rather than fluffy ambassadors of good cheer, these birds are tough, dense, efficient deep-water predators, much more likely to bite you (hard!) or whack you with a flipper than cuddle or shake your hand. The contour feathers are reduced to a continuous layer of stiff scales, and with the least-pneumatized bones of any bird, penguins are no-nonsense underwater flying machines, flapping their strong flippers to propel themselves, often to great depths, in pursuit of their prey. Limited to high-productivity ocean environments of the Southern Hemisphere, even species that nest at the equator are reliant on the upwelling of nutrient-rich cold currents.



Chinstrap Penguin, *Pygoscelis antarcticus*. South Georgia Island, southern Atlantic Ocean. © Kevin Schafer.

mer for rearing the chicks; in the King Penguin *A. patagonicus*, incubation takes place in very early spring, and the mid-sized chicks suffer through the winter with infrequent feedings until they are brought to independence by the parents the following spring as the food supply becomes more abundant. Penguin chicks are fed at or near the nest until they reach independence and leave the colony for life at sea.

**Conservation** The penguins as a family face many conservation concerns, with 15 species (83%) at some risk (4 NT, 6 VU, 5 EN). Only a few species are thought to be relatively stable, or even increasing, while many species have experienced substantial population declines. Of particular concern are the Galapagos Penguin *Spheniscus mendiculus* and the Yellow-eyed Penguin *Megadyptes antipodes*, which have small populations and are restricted in their range. Competition with commercial fishing operations, as well as changes in sea temperatures, which affect prey abundance, are considered factors in the decline of penguin populations worldwide.

**Relationships** Spheniscidae is the sole family in Sphenisciformes, which is part of a larger clade of "waterbirds" that includes Gaviiformes, Procellariiformes, and Ciconiiformes (Cracraft 1981, Livezey & Zusi 2001, 2007, Ericson *et al.* 2006a, Hackett *et al.* 2008), but affinities may be closest with Procellariiformes (Jarvis *et al.* 2014). Within the family, *Aptenodytes* is sister to the other living penguin genera (Bertelli & Giannini 2005, Baker *et al.* 2006).



Adelie Penguin, *Pygoscelis adeliae*. Ross Sea, Antarctica. © Santiago Imberti.

*APTENODYTES*
2 species



*A. forsteri*
Emperor Penguin

*PYGOSCELIS*
3 species



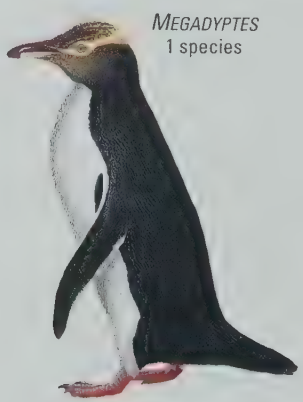
*P. papua*
Gentoo Penguin

*EUDYPTES*
7 species



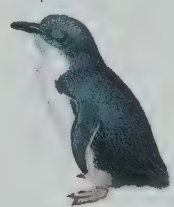
*E. chrysolophus*
Macaroni Penguin

*MEGADYPTES*
1 species



*M. antipodes*
Yellow-eyed Penguin

*EUDYPTULA*
1 species



*E. minor*
Little Penguin

*SPHENISCUS*
4 species



*S. humboldti*
Humboldt Penguin

# Order: PROCELLARIIFORMES

## Families: Oceanitidae, Diomedeidae, Hydrobatidae, Procellariidae

The Procellariiformes, or tubenoses, include three to five families (depending on how they are classified; here we recognize four families) that have long been classified together because of many shared morphological characters, including a tufted preen gland, large salt glands above the eye sockets, an oddly shaped stomach, and, most notably, as the common name of the group implies, the tube-shaped external nares (Forbes 1882, Cracraft 1981, Kennedy & Page 2002, Ericson *et al.* 2006a, Livezey & Zusi 2007). On the basis of various shared skeletal characters, Cracraft (1981) suggested that Procellariiformes is likely sister to Pelecaniformes, and Livezey and Zusi (2007) interpreted morphological characters to place Procellariiformes sister to Sphenisciformes, which would then in turn be sister to Gaviiformes and Podicipediformes (which they placed together).

The molecular analyses of this group are only a little clearer. Ericson *et al.* (2006a) confirmed the monophyly of Procellariiformes and placed it in a larger group of "waterbirds," which included Gaviiformes, Sphenisciformes, Pelecaniformes/Suliformes/Ciconiiformes, and Gruiformes. Hackett *et al.* (2008), in their analysis of many nuclear loci, found that the tubenoses are most likely sister to the penguins, forming a group that is sister to the group that includes Pelecaniformes, Suliformes, and Ciconiiformes as we define them here. The findings of Jarvis *et al.* (2014) are consistent with this result if Gaviiformes is added to the larger group of orders to which the tuberoses and penguins, taken together, are most closely related.

Relationships within Procellariiformes are also not yet fully resolved. Some morphological studies place the albatrosses as sister to the remaining tubenoses, mainly owing to the presence of primitive characters with respect to the other Procellariiformes (Cracraft 1981, Livezey & Zusi 2001). However, a more recent morphological study found the albatrosses to be more closely related to petrels (Livezey & Zusi 2007). The relationships of the other families in the order are likewise unclear. Cracraft (1981) placed the diving-petrels (*Pelecanoides*) within Procellariidae instead of in their own family. Recent molecular phylogenetic evidence supports this treatment (Ericson *et al.* 2006a), and a supertree analysis using both morphological and genetic data placed *Pelecanoides* within a clade that includes the prions (*Pachyptila*) and *Pseudobulweria* within Procellariidae (Kennedy & Page 2002). Some morphological evidence places the storm-petrels as sister to petrels (Livezey & Zusi 2001), but not all morphological studies agree on this arrangement. Livezey and Zusi (2007) instead suggested that diving-petrels are sister to the rest of Procellariiformes, followed by the storm-petrels and then petrels, with albatrosses embedded within Procellariidae. The monophyly of storm-petrels has also been questioned, with morphological studies, including a study of Procellariiformes from the 1800's, finding that storm-petrels actually form two clades (Forbes 1882, Mayr 2009). This relationship has been supported by recent molecular phylogenetic studies, which indicate that the storm-petrels form two groups that are likely not sister to one another, the "southern" storm-petrels, here classified as Oceanitidae, and the "northern" storm-petrels, Hydrobatidae (Kennedy & Page 2002, Hackett *et al.* 2008). At present, these two families form an unresolved polytomy with Diomedeidae; neither is clearly more closely related to either of the other two. However, we choose to put more weight on the findings of Hackett *et al.* (2008), placing the southern storm-petrels as sister to the rest of Procellariiformes, with the northern storm-petrels then sister to petrels (as in Cracraft 2013, Gill & Donsker 2014).



Ringed Storm-petrel, *Hydrobates hornbyi*. Lima, Peru. © Tom Johnson.

Procellariiformes

## OCEANITIDAE
Southern Storm-petrels

5 genera • 9 species

**Related Families** Hydrobatidae (northern storm-petrels), Diomedeidae (albatrosses)

**Similar Birds** Northern storm-petrels (Hydrobatidae), swallows (Hirundinidae)

**Description**
- Plumage generally dark brown or gray with white on rump and, often, in belly, breast, or face
- Wings pointed and long, though shorter on average than in Hydrobatidae; tail medium-long
- Body cylindrical ovoid, small with light wing-loading
- Bill slender, grooved, hooked, with tubular nostrils having a single front-facing opening, fluted up at the tip
- Head small with high forehead; neck short and thick
- Legs medium-long, especially compared to Hydrobatidae; front three toes webbed, hallux minute
- Sexes similar

**Habitat** During most of the year, storm-petrels exclusively inhabit pelagic marine waters. When breeding, they generally nest on small isolated islands off the coast that provide rock crevices to nest in or soil to dig burrows in.

**Food** Oceanitids take a variety of zooplankton, small fish, squid, and crustaceans that are available within reach of their short bills, pecking at the water while fluttering and pattering above.

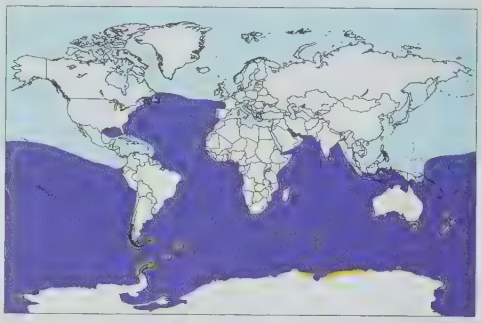
**Breeding** Storm-petrels are monogamous with biparental care, often maintaining a long- term pair bond in which the pair meets at the same nest burrow year after year. The female lays a single egg with a mass that is 20% to 30% of her body weight. Males and females share about equally in burrow construction/maintenance, incubation, brooding, and provisioning of the chick. Most details of breeding biology are better known for the Hydrobatidae, and likely are very similar.

**Conservation** Like many other seabirds that are endangered, southern storm-petrels have suffered from habitat destruction and the introduction of mammalian predators like rats and cats to formerly protected islands. The conser-



White-faced Storm-petrel, *Pelagodroma marina*. Hauraki Gulf, New Zealand. © Simon Fordham / NaturePix.





Southern storm-petrels, like their northern cousins, are swallow-like inhabitants of the open sea, and can often be seen following ships or cetaceans. When foraging, they tend to rest their webbed feet on the water while they flutter their wings above their backs, pattering their feet as they proceed along a wave face, gathering planktonic invertebrates or fish as they go. Despite their diminutive size—some are no bigger than a sparrow—these wanderers of the southern oceans are no less masters of the sea than their larger tube-nosed relatives. However, they do very little, if any, soaring, instead flapping all the way as they traverse huge expanses of the world's oceans.



Wilson's Storm-petrel, *Oceanites oceanicus*. Atlantic Ocean off Nantucket, Massachusetts, USA. © Ian Davies.

vation status is serious for two species (22%; 1 EN, 1 CR), including the critically endangered, and long-considered extinct, New Zealand Storm-petrel *Fregetta maoriana*. This species was rediscovered in 2003, but its nesting grounds are still yet to be found.

Relationships Oceanitidae is a family within Procellariiformes. Traditionally this family was classified as a subfamily within the Hydrobatidae, the family that included all storm- petrels. However, early analyses of the skeletons and muscles of the legs and wings (Forbes 1882) suggested that the genera that make up the Oceanitidae do not group with the rest of the storm-petrels. Recent molecular phylogenetic studies have confirmed these findings and indicate that the southern storm-petrels are not sister to the northern breeding group; they may be sister to Procellariidae (Kennedy & Page 2002). However, morphological studies by Mayr (2009) support the molecular phylogeny of Hackett *et al.* (2008), and place the southern storm-petrels as sister to the rest of the extant Procellariiformes. No matter how these relationships are eventually further clarified, it is clear that Oceanitidae and Hydrobatidae should be treated as separate families.



Wilson's Storm-petrel, *Oceanites oceanicus*. Continental shelf south of Cape Cod, Massachusetts, USA. © Luke Seitz.

*Oceanites*
3 species



*O. oceanicus*
Wilson's Storm-petrel

*Garrodia*
1 species



*G. nereis*
Gray-backed Storm-petrel

*Pelagodroma*
1 species



*P. marina*
White-faced Storm-petrel

*Fregetta*
3 species



*F. tropica*
Black-bellied Storm-petrel

*Nesofregetta*
1 species



*N. fuliginosa*
Polynesian Storm-petrel

Procellariiformes

# DIOMEDEIDAE
## Albatrosses

4 genera • 22 species

**Related Families** Hydrobatidae (northern storm-petrels), Oceanitidae (southern storm-petrels)

**Similar Birds** Giant petrels and shearwaters (Procellariidae), gulls (Laridae)

**Description**
- Plumage generally with white, black, or brown
- Wings pointed, very long and narrow; tail short
- Bill stout, hooked, covered with plates, with small tubular nostrils that are separated by the culmen
- Body medium to large, generally slim ovoid, compact; neck medium length, thick
- Legs short; feet webbed
- Sexes similar; males slightly larger

**Habitat** Albatrosses are pelagic birds, typically found on colder ocean waters where upwelling makes food more abundant. They come to land only to breed, nesting on remote, predator-free islands, usually far from the mainland. Albatrosses are conspicuously absent from the North Atlantic Ocean.

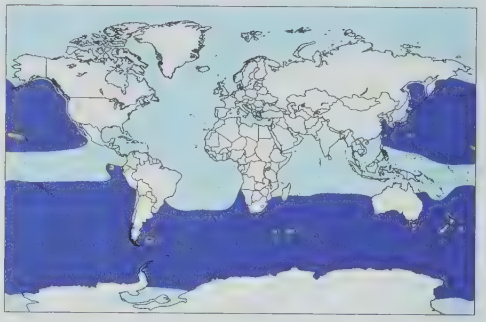
**Food** Diomedeids feed heavily on squid and other cephalopods, fish, and fish eggs (in species breeding in the tropics, flying fish and flying fish eggs are important dietary components), as well as krill and other crustaceans. Some species will also scavenge off of carcasses, especially around the breeding colonies. Albatrosses feed mainly by sitting on the water and picking food items from the surface; they do not dive for prey.

**Breeding** Albatrosses are monogamous with biparental care. They have very long-term pair bonds and a very prolonged breeding cycle, which takes almost an entire year to complete from nest construction to fledging. Thus, if successful, diomedeids are able to breed only once every other year. They nest on the ground in colonies of up to several thousand birds, and their nests vary from not even a depression in the ground to a bulky cone of mud and vegetation with a depression atop for the single-egged clutch. Both parents are active in all aspects of parental care. Incubation takes 70 to 80 days, and a parent will incubate for several days to three weeks at a time before being relieved by the other adult. Both parents take turns brooding the chick for several weeks after hatching, and both feed the chick increasing amounts in feeding bouts that are separated by many days at times. These long intervals between feed-



Southern Royal Albatross, *Diomedea epomophora*. Off Kaikoura, South Island, New Zealand. © D. W. Winkler.





Few things are more inspiring, or more humbling, than to be far out at sea in rough weather, hanging onto the railing as an albatross glides effortlessly by. These birds have the longest, narrowest wings of any bird, and all the wing bones are elongated. Indeed, the humerus is so long that the wings have an extra bend—at the elbow—when they are folded up over the body. The resulting shape equips the birds for dynamic soaring, and, with sufficient wind, they can cover vast distances with very seldom a flap of the wings. Thus, they can traverse thousands of kilometers of ocean in a single provisioning trip for their lone chick.



White-capped Albatross, *Thalassarche steadi*. Off Kaikoura, South Island, New Zealand. © D. W. Winkler.

ings arise from the great distance of foraging grounds from the colony site, and the chicks are fed a combination of freshly caught prey and digested prey and stomach oil that is very rich in lipids. The chicks fledge after four to nine months in the nest. When ready to fledge, they most often leave the nest between parental visits. They receive no further parental care, and they set off for a long period of seven to ten years on their own before returning to the nesting colony as a reproductive adult.

**Conservation** Because albatrosses have relatively low productivity, and don't start breeding until at least seven years of age, recruitment into populations is low. Add to this adult mortality due to fishing activity, particularly longline fisheries, and nest and chick predation by introduced mammalian predators at breeding colonies, and it is easy to appreciate why all albatross species have declined—some precipitously—in the past 50 years (7 NT, 7 VU, 5 EN, 3 CR). Serious conservation measures are necessary to prevent extinction of some species. Although still listed as vulnerable, the Short-tailed Albatross *Phoebastria albatrus* has benefited immensely from conservation efforts, such as decoys to attract birds to breeding colonies, as well as measures to limit bycatch of albatrosses by longline fishing operations.

**Relationships** Diomedeidae is included in the order Procellariiformes. Depending on the taxa sampled and analyses used, Diomedeidae has one of four different sister relationships to other procellariiform taxa: as sister to all other procellariiforms, to Procellariidae, to all tubenoses except Hydrobatidae, or to all tubenoses except Oceanitidae (Cracraft 1981, Livezey & Zusi 2007, Kennedy & Page 2002, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2009). In our listing of families here, we are tentatively giving highest credence to the last possibility.



Light-mantled Albatross, *Phoebetria palpebrata*. Gold Harbor, South Georgia Island, southern Atlantic Ocean. © Santiago Imberti.



Procellariiformes

# HYDROBATIDAE
## Northern Storm-petrels

1 genus • 15 species

**Related Families** Diomedeidae (albatrosses), Oceanitidae (southern storm-petrels)

**Similar Birds** Southern storm-petrels (Oceanitidae), swallows (Hirundinidae)

**Description**
- Plumage generally dark brown or black with white rump; two species predominantly gray above
- Wings long, pointed; tail medium-long
- Body small, cylindrical ovoid in shape
- Bill slender, grooved, hooked, with tubular nostrils having a single front-facing opening, fluted up at the tip
- Head small with high forehead; neck short, thick
- Legs short, delicate; front toes webbed and hallux minute
- Sexes similar

**Habitat** During most of the year, hydrobatids are found far from shore, out over open ocean. When breeding, they generally nest on small isolated islands off the coast where there are rock crevices to nest in or soil to burrow in.

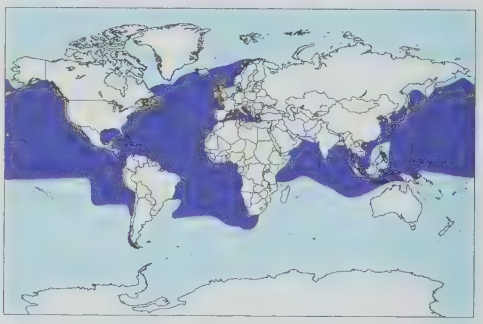
**Food** Storm-petrels flutter low over the water and pluck zooplankton, small fish, squid, and small crustaceans from the water's surface with their bills. Though they sometimes sit on the water in rafts, they do essentially all their foraging from the wing.

**Breeding** Storm-petrels are monogamous and may maintain a long-term pair bond in which a mated pair meets at the same nest burrow year after year. Most storm-petrels nest in a rock crevice or burrow, excavating the latter if necessary. The female lays a single egg with a mass of 20% to 30% of her body weight. Males and females contribute equally to parental care, from burrow construction/maintenance, through incubation, brooding, and provisioning of the chick. Incubation takes about 50 days, and the parents incubate in bouts of a couple days up to a week or so in length. The chick is usually brooded for the first week post-hatch, and the parents manage to feed it nightly for much of its development. Still, it doesn't reach fledging age until about two months post-hatch. When the chick leaves, it ventures out to sea on its own.



Fork-tailed Storm-petrel, *Hydrobates furcatus*. Gulf of Alaska, USA. © Kevin Schafer.





These storm-petrels of the northern oceans have shorter legs and skulls and longer wings than those of their cousins in the Oceanitidae. They journey to the other ends of Earth in the non-breeding season, but then find their way back to the home colony where they raise a single chick in a burrow. The chicks are remarkable balls of fluff, the downy feathers many centimeters thick, and they have the distinctive musky smell common to most in this order. These scents help guide the birds to their home burrows in the dark of night, which is a valuable trait since most visit their isolated island colonies only at night to avoid predation by gulls or frigatebirds.

**Conservation** Like many other seabirds, storm-petrels have suffered from habitat destruction and the introduction of mammalian predators like rats and cats, and six species (40%) of northern storm-petrels are at risk (2 NT, 2 VU, 1 EN, 1 CR(PE)). The Guadalupe Storm-petrel *Oceanodroma macrodactyla*, restricted to nesting on the island of Guadalupe off the Mexican coast, is listed as critically endangered, and possibly extinct; it has not been sighted since 1912.

**Relationships** Hydrobatidae is part of the order Procellariiformes. Traditionally, this family had contained two sub-groups, the northern-breeding Hydrobatinae and the southern-breeding Oceanitinae. Recent molecular phylogenetic studies indicate, however, that Hydrobatinae and Oceanitinae are not actually sister taxa and are part of a polytomy with Diomedeidae (Kennedy & Page 2002; Hackett *et al.* 2008). Additional morphological studies suggest that the northern storm-petrels are more closely related to petrels than they are to albatrosses or southern storm-petrels (Forbes 1882, Mayr 2009). Although these relationships will no doubt be further clarified in the future, the splitting of the storm-petrels into two families seems very well established.



Black Storm-petrel, *Hydrobates melania*. Monterey Bay, California, USA. © Christopher L. Wood.

*HYDROBATES*
15 species



*H. pelagicus*
European Storm-petrel

Procellariiformes

# PROCELLARIIDAE

Petrels

16 genera · 93 species

**Related Families** Hydrobatidae (northern storm-petrels), Oceanitidae (southern storm-petrels), Diomedeidae (albatrosses)

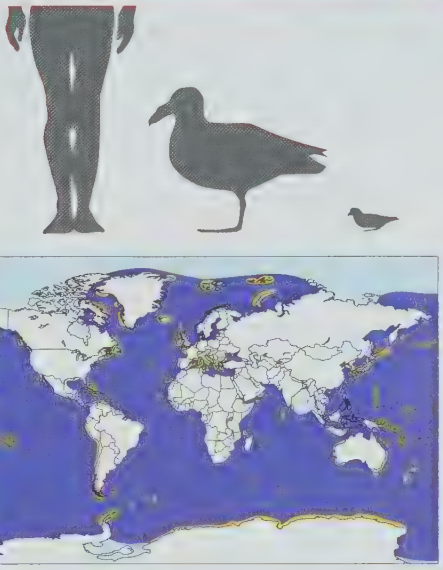
**Similar Birds** Storm-petrels (Hydrobatidae, Oceanitidae), albatrosses (Diomedeidae), gulls (Laridae)

**Description**

- Plumage some combination of black, white, gray, and dark brown, usually lighter on belly
- Wings long, pointed, and narrow in most; tail short
- Body small to medium-large, generally cylindrical ovoid to fusiform
- Bill hooked, covered with plates; nostrils tubular and fused as a single or tandem tube on the culmen
- Head small in most but large in a few; neck generally short
- Legs generally short; front three toes webbed, hallux minute
- Sexes similar



Scopoli's Shearwater, *Calonectris diomedea*. Atlantic Ocean offshore North Carolina, USA. © Tom Johnson.



**Habitat** Procellariids inhabit open oceans worldwide except when breeding. They usually breed on small islands far from the mainland that are, or at least were originally, predator free.

**Food** Most species feed primarily on small aquatic invertebrates and fish. Many of the petrels and prions grasp prey from the water while in flight, and many shearwaters dive for prey from the water surface. Some *Pachyptila* species have comb-like lamellae on the bill, and they filter for zooplankton at the surface either while sitting or sometimes while propelling themselves along the water surface with their feet and wings, mouth submerged. *Pelecanoides* species, similar in appearance and feeding behavior to murrelets (Alcidae), are distinctively able to dive from the air and pursue prey underwater all in one motion. The largest species (*Macronectes*) feed on carrion of large vertebrates and are active predators of colonial seabird eggs and chicks.

**Breeding** Procellariids are monogamous, often meeting the same mate at their nest site for many years in succession. Most species of procellariids nest in burrows or crevices, though *Macronectes* species build mounds of vegetation on the ground and *Fulmarus* species nest on cliff ledges. Many burrow-nesters nest in remote slopes, sometimes as much as 30 km from, and hundreds of meters above, the sea. Females lay a single egg, which is incubated for six to nine weeks, longer in the larger species. Both par-

Hundreds of millions of shearwaters and petrels spread out every year after breeding, following oceanic currents in great loops that span the Earth. These masters of dynamic soaring, varying in size from the thrush-sized prions to the albatross-sized giant petrels, can cover the oceans more efficiently than anything human-engineered. With diets and habits as diverse as their sizes, and an exquisite sense of smell typical of many in this order, these mariners can find planktonic prey across the featureless main. The same olfactory acuity guides them to their individual nesting burrows among many thousands of others. That they come back home with such precision has allowed the diversification of species across the islands of the world.



Black-capped Petrel, *Pterodroma hasitata*. Atlantic Ocean offshore North Carolina, USA. © Tom Johnson.

ents participate in the construction of the nest, both incubate the egg on incubation shifts of two days to two weeks, and both feed the chick. The chick is brooded at first, for up to 20 days in some species; then the parents cease brooding and visit the chick only to feed it. The parents often intersperse short feeding trips (at intervals of a few days) with long trips (at intervals more like a week), the end result from the chick's perspective being that it receives food from the parents every couple of nights or so for most of its development. Most chicks fledge and disappear out to sea at three to four months post-hatch.

Conservation At least 50 petrel species (54%) are of conservation concern because of pressure on the breeding grounds (from hunting, introduced predators, or habitat destruction) or because they are bycatch in commercial fisheries (9 NT, 20 VU, 12 EN, 8 CR, 1 CR(PE)). Because many procellariids breed on only one or a few small islands, even the most abundant species are extremely vulnerable to stochastic events, habitat alteration, and the introduction of non-native predators. In addition to having small breeding ranges, procellariids are slow to reproduce, producing only a single egg per pair, and do not reach maturity for several years after fledging. This predisposes a population to slow growth and recovery following a decline. Although there are only two documented extinctions of petrels in recent history, one species, the Jamaican Petrel *Pterodroma caribbaea*, is considered critically endangered and is very likely extinct; it has not been recorded since 1879. Conservation plans, in place for many species, include the removal of non-native predators, reintroduction to additional islands, habitat restoration, and regulation of fishing practices.

Relationships Procellariidae is in the order Procellariiformes. The diving-petrels were long thought to be sister to the shearwaters and petrels, but current evidence indicates that *Pelecanoides* is embedded within Procellariidae (Kennedy & Page 2002, Mayr 2009). Procellariidae is closely related to the two families of storm-petrels, but it remains unclear whether it is sister to Oceanitidae or Hydrobatidae. The clade made up of Procellariidae together with either Hydrobatidae or Oceanitidae is in turn sister to Diomedeidae (Kennedy & Page 2002, Hackett *et al.* 2008). Morphological evidence supports the findings of Hackett *et al.* (2008), indicating Oceanitidae as sister to the rest of the procellariforms and Procellariidae being more closely related to Hydrobatidae and Diomedeidae (Forbes 1882, Mayr 2009).



Cape Petrel, *Daption capense*, The Snares, New Zealand. © G. B. Baker.



Northern Giant Petrel, *Macronectes halli*. Off Kaikoura, South Island, New Zealand. © D. W. Winkler.



*Macronectes*
2 species

*M. giganteus*
Southern Giant Petrel



*Fulmarus*
2 species

*F. glacialis*
Northern Fulmar



*Thalassoica*
1 species

*T. antarctica*
Antarctic Petrel



*Daption*
1 species

*D. capense*
Cape Petrel



*Pagodroma*
1 species

*P. nivea*
Snow Petrel



*Halobaena*
1 species

*H. caerulea*
Blue Petrel



*Pachyptila*
6 species

*P. salvini*
Salvin's Prion



*Aphrodroma*
1 species

*A. brevirostris*
Kerguelen Petrel



*Pterodroma*
34 species

*P. cervicalis*
White-necked Petrel



*Procellaria*
5 species

*P. aequinoctialis*
White-chinned Petrel



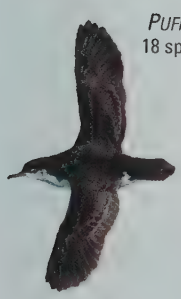
*Ardenna*
7 species

*A. bulleri*
Buller's Shearwater



*Calonectris*
4 species

*C. edwardsii*
Cape Verde Shearwater



*Puffinus*
18 species

*P. lherminieri*
Audubon's Shearwater



*Pseudobulweria*
4 species

*P. rostrata*
Tahiti Petrel



*Bulweria*
2 species

*B. bulwerii*
Bulwer's Petrel



*Pelecanoides*
4 species

*P. magellani*
Magellanic Diving-petrel

# Order: CICONIIFORMES

## CICONIIDAE
Storks

6 genera • 20 species

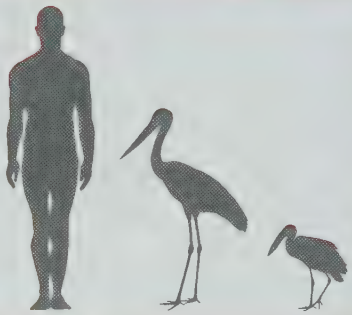
**Related Families** Fregatidae (frigatebirds), Sulidae (boobies), Phalacrocoracidae (cormorants), Anhingidae (darters), Balaenicipitidae (Shoebill), Scopidae (Hamerkop), Ardeidae (herons), Pelecanidae (pelicans)

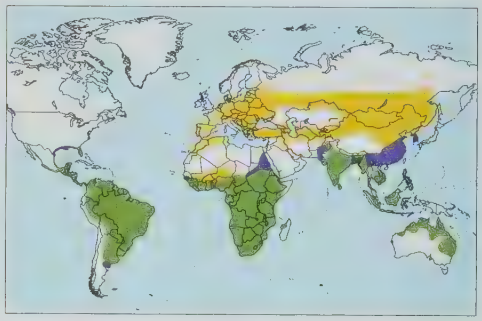
**Similar Birds** Herons (Ardeidae), Shoebill (Balaenicipitidae), Hamerkop (Scopidae), cranes (Gruidae)

**Description**
- Plumage generally white or black, often with white underparts
- Wings long, broad, and rounded; remiges typically black; tail short
- Body large, elongate ovoid, held upright
- Bill massive, straight or slightly decurved or recurved, with a gap in *Anastomus*
- Head and face often bare, brightly colored; neck long, held straight in flight
- Legs very long; toes long and webbed basally
- Sexes similar



Saddlebill, *Ephippiorhynchus senegalensis*. Kruger NP, South Africa. © Dubi Shapiro.





**Habitat** Most storks live in wetland and marsh habitats, with a few venturing into savanna or forest.

**Food** Ciconiids generally hunt in wet areas, using tactile foraging techniques to capture smaller vertebrates such as fish, amphibians, reptiles, and rodents, with some species taking many insects, mollusks, and crustaceans. The openbills (*Anastomus*) specialize on snails, and *Leptoptilos* species eat a great deal of carrion.

**Breeding** Storks are monogamous with biparental care. Some species are highly colonial, with colonies numbering in the thousands. Most aggregations, however, are smaller and sometimes include other species; some ciconiids are solitary nesters. The large, bulky nests of sticks are typically built in trees, though buildings and cliffs may suffice. Clutch size is usually 2 to 5 eggs. Both parents participate in all aspects of parental care, including nest construction, incubation, and provisioning chicks. The incubation period is about a month, and the near-naked chicks soon grow a coat of down. They cannot even stand completely until a couple weeks of age; they remain in the nest for a couple of months, and often return there to be fed by the parents occasionally for sometimes weeks later. In some species, adults regurgitate water for chicks during hot days.

**Conservation** Habitat destruction threatens

Heavy wading birds that are most diverse in the Old World, storks live in a variety of habitats. In sub-Saharan Africa, they spend much of their time on the open savanna, contending for scraps at big-game kills or snapping up the victims of grassland fires; elsewhere, they are much more tied to water. Storks may soar great distances on foraging flights or while migrating. In some species the massive bills are complemented by colored bare skin in the face or throat. Storks usually build their large stick nests high in a tree, or on rooftops in Europe. Although storks are associated with childbirth in Western cultures, they have figured heavily in many mythologies over the millennia.



African Woollyneck, *Ciconia microscelis*. Lake Langano, Ethiopia. © Piotr Jonczyk.

eight stork species (30%; 2 NT, 2 VU, 4 EN), including the endangered Storm's Stork *Ciconia stormi*. In addition to habitat loss, direct exploitation, the use of poisons and pesticides in agriculture, and reduced access to open garbage dumps for food are blamed for the precipitous decline of the Greater Adjutant *Leptoptilos dubius*, which has disappeared from much of its former range.

**Relationships** Ciconiidae is the sole family in the order Ciconiiformes. This order traditionally included many other long-legged wading birds, such as Ardeidae and Threskiornithidae (Cracraft 1981, AOU 1983). Recent large-scale phylogenetic studies have consistently indicated, however, that these formerly allied families fall into three distinct clades, classified here as the orders Ciconiiformes, Suliformes, and Pelecaniformes (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008, Gibb *et al.* 2013).



Jabiru, *Jabiru mycteria*. Transpantaneira near Rio Claro, Matto Grosso, Brazil. © D. W. Winkler.



# Order: SULIFORMES

## Families: Fregatidae, Sulidae, Phalacrocoracidae, Anhingidae

Traditionally, Pelecaniformes consisted of six families, which included the tropicbirds (Phaethontidae), the frigatebirds (Fregatidae), the pelicans (Pelecanidae), the cormorants and shags (Phalacrocoracidae), the Anhinga and darters (Anhingidae), and the boobies and gannets (Sulidae). These families were united by shared morphological characters: a gular pouch, totipalmate feet, and a distinctive placement of the salt gland. Totipalmate feet, the condition of all four toes being connected by webbing, occurs only in the traditional Pelecaniformes (Hedges & Sibley 1994, Kennedy & Spencer 2004). The monophyly of this group was questioned, however, by Sibley and Ahlquist (1990) and Hedges and Sibley (1994), and they placed Pelecaniformes, along with seven other closely related families, in an expanded Ciconiiformes.

Although Sibley and Ahlquist (1990) attempted to correct for the paraphyly of Pelecaniformes with an enlarged Ciconiiformes, we now know that even this expanded Ciconiiformes is paraphyletic. New hypotheses, using DNA sequence data, suggest that neither of these groups is monophyletic, and that previously published data suggesting the close relationship between the pelicans and the Shoebill (Balaenicipitidae) were correct (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). Further, large quantities of sequence data indicate that the storks (Ciconiidae) do not belong with the traditional Ciconiiformes, but are instead sister to the group of other traditional ciconiiform families plus Pelecaniformes (Hackett *et al.* 2008). In addition, the tropicbirds have been found to be very distantly related to the other traditional pelecaniform families, being part of an ancient lineage whose affinities are still unclear (Hackett *et al.* 2008, Jarvis *et al.* 2014).

On the basis of these new genetic data, the traditional Ciconiiformes and Pelecaniformes have been rearranged into three orders. The storks are now the only family in Ciconiiformes. The pelicans are now placed with the remaining wading birds in a rearranged Pelecaniformes, which includes the herons (Ardeidae), ibises and spoonbills (Threskiornithidae), Hamerkop (Scopidae), and Shoebill (Balaenicipitidae). The remaining families from the traditional Pelecaniformes are now placed in their own order, Suliformes. Suliformes includes the boobies and gannets, frigatebirds, cormorants and shags, and darters.

Within Suliformes, Phalacrocoracidae is sister to Anhingidae, and these two families are in turn sister to Sulidae. Fregatidae is sister to the rest of the suliform families taken together (Hackett *et al.* 2008).



Cape Gannet, *Morus capensis*. Wild Coast, Port St Johns, South Africa. © Chris Fallows.

Suliformes

# FREGATIDAE
Frigatebirds

1 genus • 5 species

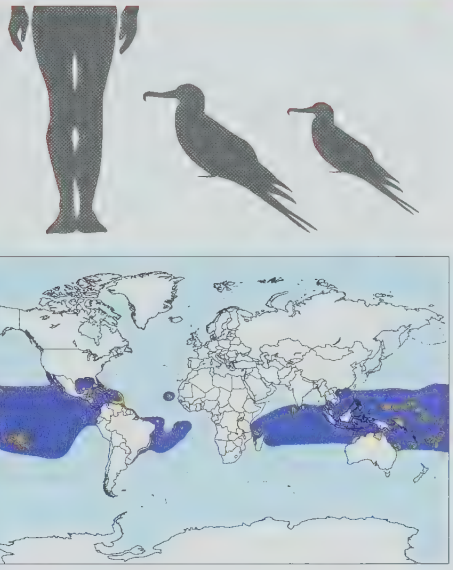
**Related Families** Sulidae (boobies), Phalacrocoracidae (cormorants), Anhingidae (darters)

**Similar Birds** Jaegers (Stercorariidae), albatrosses (Diomedeidae), terns (Laridae)

**Description**
- Plumage largely dark brown or iridescent black
- Wings very long, narrow, pointed; tail long, forked
- Body cylindrical ovoid; small to medium
- Bill long, strongly hooked, lacks external nostrils
- Head small, rounded; neck short
- Legs short; feet small and totipalmate
- Males with patches of iridescent feathers on the back and wing coverts, large expandable red gular pouch during the breeding season; females larger with patches of white on the head and breast



Magnificent Frigatebird, *Fregata magnificens*. North Seymour Island, Galapagos. © Virginia E. Winkler.



**Habitat** During the non-breeding season, frigatebirds stay at sea, remaining on the wing for many days at a time. Frigatebirds nest on offshore islands, and during the breeding season their foraging range is considerably constrained.

**Food** Frigatebirds feed on a variety of marine vertebrates and invertebrates, with a particular preference for flying fish and squid. They will take an assortment of other items, including many other types of fish, jellyfish, and, during the breeding season, even the eggs and chicks of other seabirds. Although frigatebirds are sometimes kleptoparasites, pirating food from other birds, they more frequently catch food on their own, snatching prey near the surface of the water.

**Breeding** Frigatebirds are monogamous with biparental care. Males court from an old nest from the previous year, inflating the scarlet gular pouch and vibrating their spread wings and head energetically whenever a female flies overhead. Pairs then collaborate in nest construction, with the males gathering most of the sticks for the female to mold into a nest. Most frigatebirds build a simple platform nest in a small bush or tree, but the Ascension Frigatebird *Fregata aquila* nests on the ground and builds no nest. Female frigatebirds lay a single egg, and both parents help with incubation, brooding, and bringing food to the chick. Incubation takes 40 to 55 days, and, depending on food availability, the chicks fledge after 135 to 210 days. Fledglings remain in contact with their parents for some time, occasionally being fed by them up to 14 months after fledging.

**Conservation** Two species (40%) face some level of conservation concern (1 VU, 1 CR). The Christmas Frigatebird *Fregata andrewsi*, currently listed as critically endangered, is restricted to Christmas Island in the Indian Ocean, and its rapid decline is due to deforestation.

**Relationships** The frigatebirds belong in Suliformes, where they are sister to the remaining three families in this order: Phalacrocoracidae, Anhingidae, and Sulidae (Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). The hypothesis (Livezey & Zusi 2007) that Fregatidae is also allied with Phaethontidae has not been supported by molecular studies (Hackett *et al.* 2008).

Fregatidae has two colloquial English names, frigatebirds and man-o'-war birds, both of which conjure up swift and lethal sea craft, and frigatebirds vie with jaegers as the consummate pirates of the sea. They frequently steal food from other birds, targeting those returning, laden, to their breeding colonies. With many bones fused in the thoracic girdle, the skeleton has the lightest wing-loading of any bird, weighing only half the weight of the feathers. Frigatebirds somehow manage to have both long narrow wings for efficient soaring and remarkable maneuverability. They readily pluck flying fish from the air and other fish from the very surface, but lacking waterproof plumage they are loath to dive or swim and will drown if their feathers get too saturated.



Great Frigatebird, *Fregata minor*. Galapagos. © Kevin Schafer.

*FREGATA*
5 species



*F. andrewsi*
Christmas Frigatebird

Suliformes

## SULIDAE
### Boobies

3 genera • 10 species

**Related Families** Phalacrocoracidae (cormorants), Anhingidae (darters), Fregatidae (frigatebirds)

**Similar Birds** Large gulls (Laridae), albatrosses (Diomedeidae), large petrels and shearwaters (Procellariidae)

**Description**
- Plumage generally white with black in wings, or brown with white belly
- Wings long, pointed; tail medium-short but wedge-shaped
- Body medium-sized, long, fusiform
- Bill conical, sharply pointed without a hook, often brightly colored, with sharp cutting edge; no external nostrils
- Head and neck long but stout; unfeathered facial and gular skin often brightly colored
- Legs short; feet large, totipalmate, sometimes brightly colored
- Sexes very similar

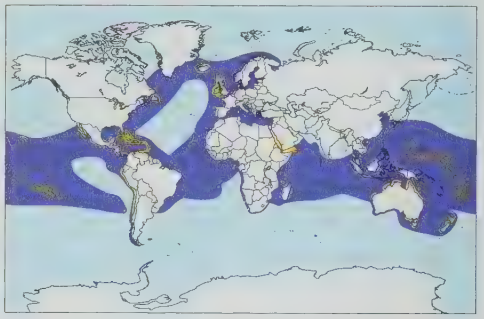
**Habitat** Gannets and boobies are primarily pelagic during most of the year, although they usually do not range far beyond the continental shelf. Sulids typically nest on small offshore islands away from mammalian predators.

**Food** Gannets and boobies feed on a wide variety of fish and squid. Sulids have a spectacular method for catching prey, often diving from as high as 100 m above the water. When diving, they are truly torpedo-like, pulling back their wings into a streamlined configuration that allows them to plunge to 10 m, followed by further pursuit of their prey underwater up to depths of 25 m. This foraging strategy allows sulids to exploit large shoals of energy-rich fish that are off limits to other birds.



Red-footed Booby, *Sula sula*.
Genovesa Island, Galapagos. © Virginia E. Winkler.





**Breeding** Sulids are monogamous, many with long-lasting pair bonds and biparental care. Their highly developed courtship displays often emphasize brightly colored feet. Nesting substrates vary among species, ranging from flat or steeply sloping ground to cliffs and trees. Most ground-nesting boobies make simple scrapes whereas gannets build mounded cones of seaweed, grasses, and feathers, which are cemented with guano. Red-footed Booby *Sula sula* and Abbott's Booby *Papasula abbotti* build simple stick nests in trees. Clutch size varies from 1 to 3, with the gannets laying only a single egg,

Their comical courtship displays, showing off brightly colored feet to potential mates, together with their resolute attendance of their nests and relative slowness on land, gave boobies their name. But at sea, where they spend most of their lives, the sulids are most impressive predators. Scissoring their long wings behind them, they plunge from great heights in pursuit of schooling fish near the surface, slicing down into the water at speeds over 100 km per hour. It is thus no accident that they lack external nostrils. Sitting in a small boat among a flock of boobies or gannets sizzling into the water is one of the most exciting experiences an ornithologist can have.



Northern Gannet, *Morus bassanus*. Atlantic Ocean offshore Massachusetts, USA. © Ian Davies.

Blue-footed Booby *S. nebouxii* and Peruvian Booby *S. variegata* regularly laying up to 3, and the other boobies laying 1 or 2. Both members of a pair participate in all aspects of parental care, including incubation, brooding of chicks, and provisioning of young. Incubation takes 41 to 45 days (up to 57 days in *Papasula*), and the chicks fledge after about 2.5 months of feeding (5 months in *Papasula*). The can be fed by their parents occasionally up to nine months post-fledging.

**Conservation** Two species of sulids (20%) are at risk (1 VU, 1 EN). The endangered Abbott's Booby *Papasula abbotti* is restricted to Christmas Island, where it is rapidly declining due to habitat destruction, hunting, and introduced mammalian predators.

**Relationships** Sulidae has traditionally been considered part of the order Pelecaniformes, but more recent morphological and molecular studies have found it to be sister to the clade formed by Phalacrocoracidae and Anhingidae (Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). These families together are sister to Fregatidae (Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008), forming the group that we recognize as Suliformes.



Blue-footed Booby, *Sula nebouxii*. Galapagos. © Francesco Veronesi.



Australasian Gannet, *Morus serrator*. Muriwai Beach, New Zealand. © D. W. Winkler.

*PAPASULA*
1 species



*P. abbotti*
Abbott's Booby

*MORUS*
3 species



*M. bassanus*
Northern Gannet

*SULA*
6 species



*S. leucogaster*
Brown Booby

Suliformes

# PHALACROCORACIDAE
## Cormorants

2 genera • 34 species

**Related Families** Anhingidae (darters), Sulidae (boobies), Fregatidae (frigatebirds)

**Similar Birds** Loons (Gaviidae), Anhinga and darters (Anhingidae)

**Description**
- Plumage typically black with varying amounts of white and gray
- Wings long, rounded; tail long and stiff
- Body elongate, cylindrical
- Bill slender, hooked; external nostrils absent
- Head oblong; eyes and bare facial and gular skin often brightly colored
- Legs short; feet large, robust, totipalmate
- Sexes similar

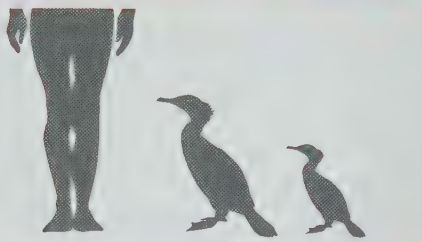
**Habitat** Most cormorant and shag species live along the sea coasts, breeding in large coastal colonies or on small islands just offshore; however, some species are primarily freshwater inhabitants.

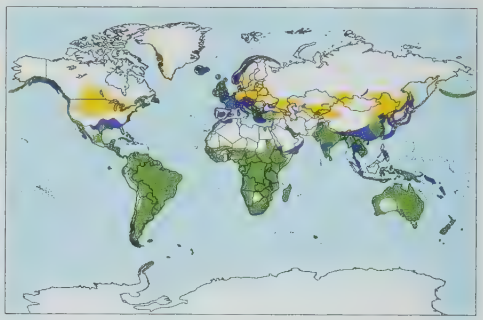
**Food** Cormorants and shags feed primarily on fish of a wide variety of species, but many also take a smaller number of crustaceans, mollusks, or cephalopods. Cormorants in Asia are sometimes adopted as household commensals, trained to dive for fish from a boat, fastened by a tether on a neck collar that is too tight to allow swallowing the fish they catch.

**Breeding** Cormorants and shags are monogamous with biparental care. Though some species will nest in trees, they typically nest on the ground, often in a bowl-shaped nest made of seaweed and grass that is held together with mud and excrement, although some species merely construct a scrape on the ground.



Red-legged Cormorant, *Phalacrocorax gaimardi*, Puerto Deseado, Santa Cruz, Argentina. © Kevin Schafer.





Cormorants and shags usually lay 2 to 4 eggs, although up to 7 can be laid. Both male and female assist in nest construction, incubation, and provisioning the chicks. Incubation begins after only the first or second egg is laid; thus chicks hatch asynchronously and develop an evident size hierarchy within the brood. Incubation takes 23 to 35 days, and the chicks fledge after 50 to 80 days in the nest. Post-fledging care can last up to 4 months.

**Conservation** At least 14 cormorant species (41%) face conservation challenges, and populations have declined as a result of introduced mam-

Cormorants and shags are foot-propelled divers that grasp their piscine prey with sharply hooked bills. Possessing poorly waterproofed plumage, they never wander far from shore, but they can be found on all but the most polar coasts, and inland on freshwater rivers and lakes. The plumage of Northern Hemisphere cormorants is mostly dark brown or black, but in the Southern Hemisphere there is a radiation of shags in boldly patterned grays and white and black. Some species are accented with bright red, yellow, or blue feet or facial skin. Their eyes, often of a beguiling blue or blue-green color, apparently focus very poorly under water, perhaps explaining why they often take such large fish.



Red-faced Cormorant, *Phalacrocorax urile*. Medny Island, Russia. © Benjamin Van Doren.

malian predators, disturbance, changes to fisheries, and climate change (3 NT, 7 VU, 3 EN, 1 CR). One species has even gone extinct in the past 150 years: the Spectacled Cormorant *Phalacrocorax perspicillatus*, found on islands in the Bering Sea, was thought to be flightless (or nearly so) and went extinct shortly after being described.

**Relationships** Phalacrocoracidae traditionally has been placed in Pelecaniformes, but recent phylogenetic evidence shows that it is embedded within a group that also includes Anhingidae, Sulidae, and Fregatidae, which we treat here collectively as the order Suliformes. Within this group, Phalacrocoracidae is sister to Anhingidae, and these together are in turn sister to Sulidae, and these three together are sister to Fregatidae (Livezey & Zusi 2001, van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008).



Flightless Cormorant, *Phalacrocorax harrisi*. Fernandina Island, Galapagos. © Reinder Doeleman.



Imperial Shag, *Phalacrocorax atriceps*. Port Lockroy, Goudier Island, Antarctica. © Christopher L. Wood.

*PHALACROCORAX*
29 species

*MICROCARBO*
5 species



*M. pygmaeus*
Pygmy Cormorant



*P. carbo*
Great Cormorant

Suliformes

# ANHINGIDAE
## Darters

1 genus · 4 species

Similar Birds Phalacrocoracidae (cormorants), Sulidae (boobies), Fregatidae (frigatebirds)

Similar Birds Cormorants (Phalacrocoracidae), loons (Gaviidae)

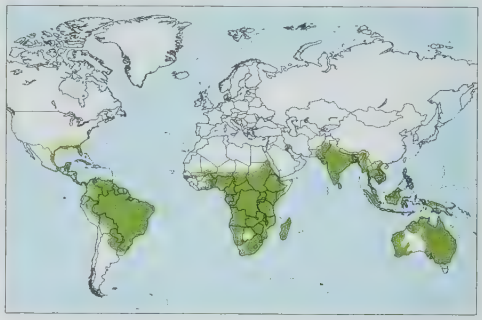
Description
- Plumage brown to glossy black with white accents; feathers not waterproof, which reduces buoyancy
- Wings long; tail long and broad; two longest scapulars and central rectrices corrugated in older birds
- Body medium-sized, slender, long, and fusiform
- Bill long, thin, and sharp, finely serrated, with no external nostrils
- Head very small; neck long, thin
- Legs short, supporting large, robust, totipalmate feet
- Males more contrastingly colored than females

Habitat Darters primarily inhabit freshwater habitats in the tropics and subtropics, although they sometimes occur in brackish and tidal habitats. They prefer shallow waterways, as they require substantial perches for drying themselves between foraging bouts.



African Darter, *Anhinga rufa*.
Kruger NP, South Africa. © John McKean.





Like their cormorant cousins, darters are foot-propelled divers that lack waterproof plumage. This, together with dense bones, reduces their buoyancy, and their behavior of swimming along with just their neck and bill above the surface has earned them the name of "snakebird" in parts of North America. They pursue fish in tropical lakes and streams, harpooning them with their stiletto-like bills. Surfacing with the victim impaled, they toss it into the air, grab it, and swallow it headfirst. Unlike any other bird, the central tail feathers and some of the inner flight feathers of the wing, especially in males, bear distinct transverse corrugations along their length, which are easily seen in birds spreading their wings to dry.

Food Anhingids feed primarily on small, laterally compressed fish, supplemented at times by crustaceans, mollusks, insects, leeches, and amphibians. They hunt by swimming underwater and spearing fish in the side. They eat larger prey items out of the water, first removing it from the bill, then swallowing it headfirst. They typically forage in shallow water, with wings held out and neck folded. Like a submerged heron, they often wait for prey to approach them, sometimes spreading their wings partially to provide attractive shade for unwitting prey.

Breeding Anhingas and darters are monogamous. They nest either singly or in loose colonies that can number several hundred pairs. Darters nest in trees, bushes, or dense vegetation near, and often overhanging, the water; the nest is bulky, made of sticks and lined with leaves. Females typically lay 4 eggs, although clutch size can vary from 2 to 6. Nests are constructed by the female, who uses material the male brings to her; both sexes incubate the eggs, brood the chicks, and provision the young. Incubation takes 25 to 30 days, fledging six to seven months.

Conservation The draining of wetlands and pollution have caused the decline of the Oriental Darter *Anhinga melanogaster* (1 NT), the only anhingid species (25%) at risk.

Relationships Anhingids have traditionally been placed in the order Pelecaniformes on the basis of shared morphological characters (Hedges & Sibley 1994), but recent phylogenetic evidence shows that Anhingidae is most closely related to Phalacrocoracidae within a group that also contains Sulidae and Fregatidae, all of which we treat here together as the order Suliformes (Siegel-Causey 1988, Livezey & Zusi 2001, van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008).



Australasian Darter, *Anhinga novaehollandiae*. Kidston Dam, Queensland, Australia. © Con Foley.

*ANHINGA*
4 species



*A. anhinga*
Anhinga

# Order: PELECANIFORMES

## Families: Threskiornithidae, Ardeidae, Scopidae, Balaenicipitidae, Pelecanidae

The traditional Pelecaniformes and the traditionally recognized Ciconiiformes have long been thought to be closely related (Sibley & Ahlquist 1990, Hedges & Sibley 1994, van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). However, many authors have found evidence for the paraphyly of these two groups, indicating either that the Shoebill *Balaeniceps rex*, traditionally placed in Ciconiiformes, is actually more closely related to the pelicans within the traditional Pelecaniformes (Cracraft 1981, Livezey & Zusi 2001), or that the pelicans are actually more closely related to the Shoebill and Hamerkop *Scopus umbretta* within the traditional Ciconiiformes than they are to the rest of families in the traditional Pelecaniformes (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). Similarly, morphological characters indicate that Shoebill and Hamerkop are sister groups, in turn most closely related to pelicans (Mayr 2003, Mayr 2011).

The traditional members of Pelecaniformes, including the tropicbirds, were all assumed to be related based on several morphological characters, including their gular pouch and totipalmate feet, the latter occurring only in the traditional Pelecaniformes (Hedges & Sibley 1994, Kennedy & Spencer 2004, Mayr 2011). Early DNA-DNA hybridization work indicated the paraphyly of both Ciconiiformes and Pelecaniformes, leading to the suggestion that both these orders, along with seven other closely related orders, should all be placed in a greatly expanded Ciconiiformes (Sibley & Ahlquist 1990, Hedges & Sibley 1994).

More recent analyses indicate that even this expanded Ciconiiformes is also paraphyletic and does not reflect the current hypotheses of the relationships between the included groups, largely as a result of tropicbirds falling far outside of these groups (Hackett *et al.* 2008, Jarvis *et al.* 2014). While the rest of the members of the expanded Ciconiiformes of Sibley and Ahlquist (1990) do form a well-supported clade, the relationships appear to be different from those originally proposed. The previously published data suggesting the close relationship between pelicans and Shoebill have been confirmed by many authors (van Tuinen *et al.* 2001, Mayr 2003, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2011), and it is now clear that the storks fall outside the traditional Ciconiiformes, being instead sister to a group composed of all other traditional Ciconiiformes plus Pelecaniformes (Hackett *et al.* 2008).

Clearly, the two traditional orders of Ciconiiformes and Pelecaniformes require rearrangement, and we treat Pelecaniformes as including ibises and spoonbills (Threskiornithidae), herons (Ardeidae), Hamerkop (Scopidae), Shoebill (Balaenicipitidae), and pelicans (Pelecanidae). Within this newly reorganized order, Shoebill and Hamerkop are sister, which are in turn sister to pelicans (Mayr 2003, Hackett *et al.* 2008, Mayr 2011). This small group is then in turn sister to herons, with ibises and spoonbills then in turn sister to all the rest in the order. At the broader scale, Pelecaniformes appears to be sister to Suliformes. These orders together then appear to be sister to storks (Ciconiidae), the lone family in a newly restricted Order Ciconiiformes. While the exact relationships of the families in these three orders are still not completely resolved, taken together they appear to be sister to a clade made up of Procellariiformes plus Sphenisciformes (Hackett *et al.* 2008, Jarvis *et al.* 2014).



Gray Heron, *Ardea cinerea*. Étang du Charnier, Languedoc-Roussillon, France. © Ian Davies.

# THRESKIORNITHIDAE

## Ibises and Spoonbills

14 genera • 35 species

**Related Families** Ardeidae (herons), Scopidae (Hamerkop), Balaenicipitidae (Shoebill), Pelecanidae (pelicans)

**Similar Birds** Limpkin (Aramidae), flamingos (Phoenicopteridae), storks (Ciconiidae), curlews (Scolopacidae)

**Description**

- Ibises typically black, white, or brown, often with glossy highlights; spoonbills white or pink with colorful highlights; shaggy crests on the napes of some species
- Wings long, broad; tail short
- Body medium to large; elongate ovoid in shape
- Bill long, slender; decurved and grooved in ibises, spatulate in spoonbills
- Face, throat, and/or neck bare, with bright colors in breeding season; neck long, slender
- Legs medium-long, thick; toes slightly webbed at bases
- Sexes similar; females have slightly shorter, finer bills than males

**Habitat** Most threskiornithids live in open wetlands, with a few species preferring savanna and some flooded forests.

**Food** Ibises and spoonbills eat a great variety of prey, either terrestrial or aquatic. Both invertebrates and small vertebrates are taken, including mollusks, crustaceans, worms, insects (including larvae), amphibians, lizards, rodents, and fish. Ibises and spoonbills use their tactile senses in finding prey, ibises by probing mud and water, and spoonbills by sweeping their bills back and forth through the water.

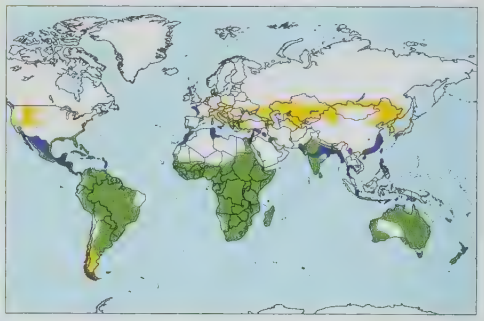
**Breeding** Threskiornithids are monogamous with biparental care. Most are colonial species that nest in trees or bushes near or over water, but some species nest on protected cliffs and others are solitary nesters. The nests are typically large platforms constructed of sticks, upon which is laid finer materials such as grasses, rushes, and leaves that are often roughly woven together. Typical clutches contain 2 to 5 eggs, but a range of 1 to 7 has been recorded. Both males and females participate in all aspects of parental care, from nest construction and incubation to feeding the young. Incubation takes two to three weeks, and the chicks hatch with little to no down and short, straight, fleshy bills that will grow into either ibis or spoonbill shapes. As in other aspects of their breeding biology, the fledging period is quite variable, with chicks leaving the nest for good in a month to two after hatching.

**Conservation** Habitat destruction and disturbance at breeding sites are the major threats to ibises and spoonbills, putting 11 species (31%) at risk (3 NT, 1 VU, 3 EN, 4 CR). Three species in particular highlight the threats faced by threskiornithids. The Dwarf Ibis *Bostrychia boc-*



Southern Bald Ibis, *Geronticus calvus*. Witsieshoek Mountain Lodge, South Africa. © Dubi Shapiro.





As their long, decurved bills might suggest, ibises eat many things that they pull out of the mud. Spoonbills, in contrast, glean prey from the water as they sweep their spatulate bills side to side. Despite these morphological and dietary differences, these birds are remarkably similar in most aspects of their biology. They hatch with an undifferentiated bill, and chicks of some have vestigial claws on their wing digits that soon disappear. They fly straight-necked and buoyantly, and many species bear small black or red accents in their wings that make them appear especially graceful. Some ibises have shifted to a mostly terrestrial existence away from water, nesting on cliffs rather than in trees and shrubs on protected islands.



Black-faced Spoonbill, *Platalea minor*. Ittonzaki Bay, Amami Oshima, Japan. © Ian Davies.

*agei*, endemic to São Tomé, was long believed extinct until it was rediscovered in 1990. It has a tiny population and is still hunted by locals. The Northern Bald Ibis *Geronticus eremita*, with a population of only 210, is slowly increasing after rapid declines, yet it is still plagued by disturbances at breeding sites and habitat destruction. The Black-faced Spoonbill *Platalea minor*, the only endangered spoonbill, has a small population in East Asia that is threatened by pollution and the draining of wetlands.

**Relationships** Threskiornithidae is part of Pelecaniformes, within which it is most likely sister to Ardeidae. These two families taken as a group are in turn sister to a clade that includes Hamerkop, Shoebill, and pelicans (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008). Relationships within Threskiornithidae are not fully resolved, but both morphological comparisons and DNA-DNA hybridization studies suggest that the spoonbills are embedded within the ibises as the sister group to *Threskiornis* (Sheldon & Slikas 1997).



Buff-necked Ibis, *Theristicus caudatus*. Ushuaia, Tierra del Fuego, Argentina. © Ramón Casares.



Pelecaniformes

# ARDEIDAE
## Herons

18 genera · 64 species

**Related Families** Threskiornithidae (ibises and spoonbills), Pelecanidae (pelicans)

**Similar Birds** Cranes (Gruidae), storks (Ciconiidae), Hamerkop (Scopidae)

**Description**
- Plumage with powderdown, white and/or gray or black, often with long filamentous plumes on head or back, or brown with darker streaks and barring
- Wings long, broad; tail short
- Body small to large, ovoid
- Head slightly elongate; bill straight, medium to long, sharp; lores bare; neck typically long, slender, folded in flight
- Legs and toes long
- Sexes generally similar; males brighter than females in *Ixobrychus*

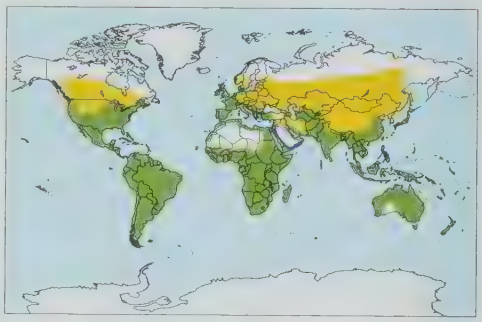
**Habitat** Most herons live on or near bodies of water, in habitats ranging from open marsh and shores to savanna and dense forests. In general, the larger species prefer more open habitats. During the breeding season, most herons and egrets need trees or shrubs, or isolated islands, for nesting, whereas bitterns hide their nests deep in marshes.

**Food** Ardeids have a varied diet that includes a large proportion of aquatic and terrestrial vertebrates (fish, amphibians, small birds, and mammals) and invertebrates. They vary from active, probing pursuers of prey to unflappable sit-and-wait predators. Some species have taken this foraging strategy to an extreme, luring in fish prey with shade from outspread wings or small bits of food as bait. The Cattle Egret *Bubulcus ibis*, on the other hand, hunts in open grasslands, where it forages close to large mammals that flush prey. All species seize their prey with a lightning quick jab and grasp of the bill.



Western Reef Heron, *Egretta gularis*. Kotu, Gambia. © Piotr Jonczyk.





**Breeding** Herons are generally monogamous with biparental care, though some cases of polygyny and promiscuity have been reported. Most species nest in colonies, but most bitterns and some of the larger herons tend to nest solitarily. During the breeding season, many herons and egrets acquire ornate plumes on their heads and backs, as well as brightly colored bare skin. Most herons build their rough platform nests of sticks in a tree or larger shrub near or over the water, whereas bitterns build their nests of reeds in a marsh. Herons generally lay

Lithe wetland predators, herons are adapted to throwing their dagger-like skull at prey with lightning quickness and fatal accuracy. Whether standing and with great patience (even under shade that they produce with an umbrella made by their wings), or stirring up the bottom to see what they can dislodge (or attract) with their toes, these birds mix stillness with quick and decisive action. The same sharp bill that makes these birds such effective predators makes them dangerous in the hand: if you get this close, wear safety glasses. Still, they must resort to sheltered or remote nest sites to find safety from mammalian predators, and it is a strange sight indeed to see a tall heron perched on a tree-top limb, attending its large stick nest.



Cattle Egret, *Bubulcus ibis*. Minden, Queensland, Australia. © B.G. Thomson.

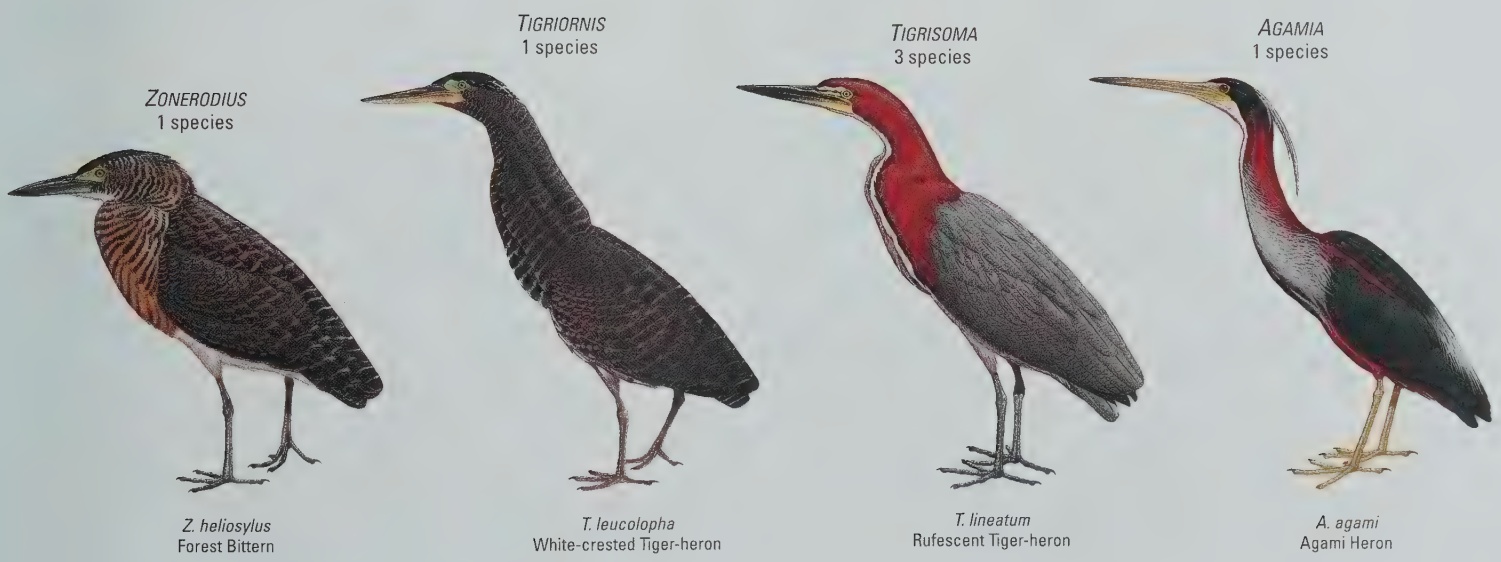
3 to 7 eggs in a clutch. Both parents take part in nest construction, incubation, and provisioning of the young. Incubation takes 14 to 30 days (longer in larger species), and chicks hatch asynchronously, leading to sibling competition that can result in the death of the weaker chick. Chicks leave the nest after 25 to 90 days, but many are not independent of their parents for at least a couple of weeks post-fledging.

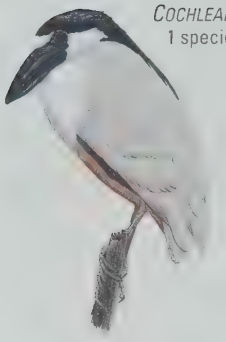
**Conservation** Populations of 12 heron species (19%) are declining as a result of destruction and fragmentation of habitat, in addition to hunting (3 NT, 3 VU, 5 EN, 1 CR). The critically endangered White-bellied Heron *Ardea insignis* has a maximum estimated population of only 250 individuals.

**Relationships** Ardeidae belongs in Pelecaniformes, within which it appears to be sister to Threskiornithidae (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008); these two together form a clade that is sister to the other members of Pelecaniformes. Alternatively, Ardeidae may be sister to Pelecanidae (Jarvis *et al.* 2014). Within Ardeidae, there appear to be four main clades. The first clade is composed of *Tigrisoma* and *Tigriornis* tiger-herons, the second the Boat-billed Heron *Cochlearius cochlearius*, and the third made up of bitterns and the Zigzag Heron *Zebrilus undulatus*. This third clade appears to be sister to the fourth, made up of all the typical herons and night-herons (McCracken & Sheldon 1998).



Common Little Bittern, *Ixobrychus minutus*. Büyükçekmece, Istanbul, Turkey. © Murat Cuhadaroglu.





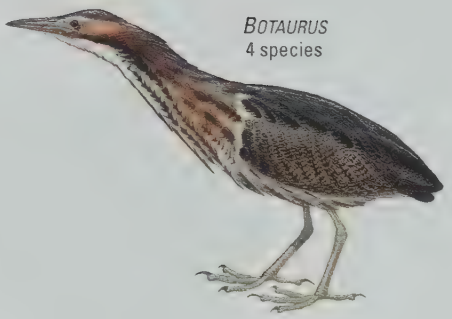
*Cochlearius*
1 species

*C. cochlearius*
Boat-billed Heron



*Zebrilus*
1 species

*Z. undulatus*
Zigzag Heron



*Botaurus*
4 species

*B. poiciloptilus*
Australasian Bittern



*Ixobrychus*
9 species

*I. exilis*
Least Bittern



*Gorsachius*
3 species

*G. melanolophus*
Malay Night-heron



*Calherodius*
1 species

*C. leuconotus*
White-backed Night-heron



*Nycticorax*
3 species

*N. nycticorax*
Black-crowned Night-heron



*Butorides*
1 species

*B. striata*
Green-backed Heron



*Ardeola*
6 species

*A. bacchus*
Chinese Pond-heron



*Bubulcus*
1 species

*B. ibis*
Cattle Egret



*Ardea*
14 species

*A. goliath*
Goliath Heron



*Syrigma*
1 species

*S. sibilatrix*
Whistling Heron



*Pilherodius*
1 species

*P. pileatus*
Capped Heron



*Egretta*
12 species

*E. garzetta*
Little Egret

Pelecaniformes

## SCOPIDAE
Hamerkop

1 genus · 1 species

**Related Families** Balaenicipitidae (Shoebill), Pelecanidae (pelicans)

**Similar Birds** Herons (Ardeidae), ibises (Threskiornithidae)

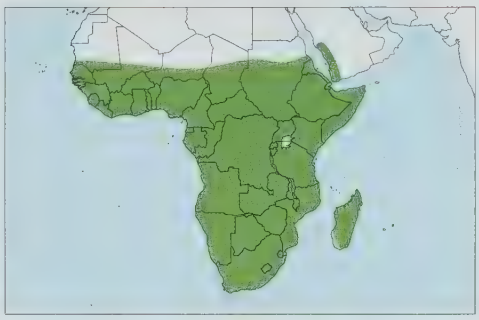
**Description**
- Plumage entirely brown
- Wings long, broad; tail long
- Body medium-small, slim, ovoid in shape
- Long, deep, laterally compressed bill, with terminal hook and a groove parallel to the culmen
- Head elongated; long coherent crest; neck medium-short, thick
- Legs long; toes medium length, webbed at base
- Sexes similar

**Habitat** Hamerkops are primarily found in open country near water (streams, rivers, waterholes, etc.), and most often near trees, their preferred nesting substrate.



Hamerkop, *Scopus umbretta*. Lake Awasa, Southern Nations, Nationalities and Peoples' Region, Ethiopia. © Ian Davies.





**Food** With its laterally compressed bill, the Hamerkop is specialized for feeding on small fish and frogs, being especially fond of clawed frogs (*Xenopus*). It is also known to feed on crustaceans, worms, and occasionally small birds and mammals. Though usually capturing prey heron-like from the shore, Hamerkops sometimes fly low over the water, scooping up tadpoles or small fish from the surface while in flight.

**Breeding** Hamerkops are monogamous with biparental care. There is some evidence that other adults will assist the breeding pair with nest construction, although it is unclear what, if any, role these helpers have in the later breeding attempt. Hamerkops build the largest nest of any bird, a massive structure built mostly of sticks held together with mud, usually placed in a tree and often adorned with objects such as bones and scraps of fabric. Starting with a platform, the walls are then built up, and a roof, often very thick, over this central chamber tops off the construction. The only entrance hole is located on the underside of the nest and leads to the nest chamber, which is lined with mud and leaves. Females typically lay 3 to 6 eggs. Both male and female Hamerkops are active throughout much of the year in building nests, which they roost in when they are not nesting. Single pairs may build up to a handful of nests in a single year, and they have up to a dozen that they can visit at any given time. Nest predation rates are not as low as one might suspect, and multiple nests in a pair's territory may help to reduce predation risk at any given nest. Both male and female incubate, though the female may do more than her share, and both parents feed the chicks. The downy chicks hatch, asynchronously, after an incubation period of about a month, and they remain in the nest until they fledge at about six weeks of age.

**Conservation** The Hamerkop faces no immediate conservation concerns.

**Relationships** The Hamerkop is in Pelecaniformes, within which it is most likely sister to the Shoebill. These two taken together appear to be sister to the pelicans (van Tuinen *et al.* 2001, Mayr 2003, Hackett *et al.* 2008, Mayr 2011).



Hamerkop, *Scopus umbretta*. Mabamba Wetlands, Uganda. © Nik Borrow.

Seen near their massive nests, the crow-sized Hamerkops seem awkwardly out of scale. Single pairs build these stick nests, which are so substantial that they provide resting place and shelter for many other animals. This species is revered in many local cultures for setting a good example with its dedicated parenting. A modest brown bird, it walks and swallows like a heron, though it lacks the herons' long neck for making more distant captures. The Hamerkop's long tail and broad wings give it a rather heavy-tailed look, slightly balanced by its crested head. That crest, swept back like no other, together with the long triangular bill, really does give the head a hammer-like shape.

*SCOPUS*
1 species



*S. umbretta*
Hamerkop

Pelecaniformes

# BALAENICIPITIDAE
## Shoebill

1 genus • 1 species

Related Families Scopidae (Hamerkop), Pelecanidae (pelicans)

Similar Birds Storks (Ciconiidae), pelicans (Pelecanidae)

Description
- Plumage primarily dull gray
- Wings long; tail short
- Body large, ovoid in shape
- Bill large, reminiscent of a wooden shoe, with large terminal hook
- Head large and blocky, with short crest on nape; neck thick, medium-long, folded in flight
- Legs long, thick; toes long, stout, unwebbed
- Sexes similar

Habitat Shoebills live in swampy marshland, particularly papyrus swamps with floating mats of vegetation.

Food Shoebills feed primarily on aquatic vertebrates by plunging their bills into the water through thick vegetation. Lungfish (Protopteridae) and ropefish (Polypteridae) constitute the majority of prey items taken.

Breeding Shoebills are apparently monogamous with biparental care, but even during nesting they are relatively solitary, and the pair is rarely seen together. Shoebills build a nest of piled vegetation either on mats of floating vegetation or on small islands in the middle of extensive marshes. Females lay clutches of 1 to 3, but typically 2, eggs. Because they are difficult to distinguish in the field, little is known of the roles of males and females in parental care. Incubation lasts about a month, and usually at most a single chick fledges after a little more than three months in the nest. Adults often mash up prey so young chicks can eat them more easily. Adults also bring water to the nest to cool the eggs and chicks in hot weather.

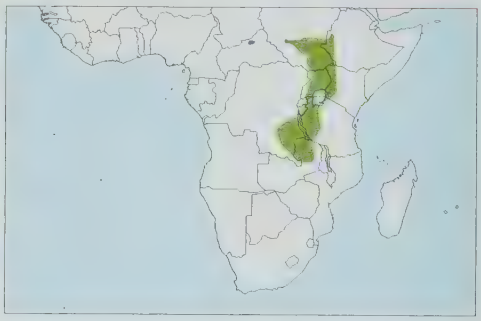
Conservation Because of its very specific habitat requirements and sensitivity to human activity, the Shoebill is currently listed as vulnerable (1 VU). While not susceptible to predation, and able to drive away most predators from the nest site, the Shoebill is most at risk from human depredation and the draining of swamps.

Relationships Recent molecular work unambiguously places the Shoebill in Pelecaniformes, but the history of its classification is complex. Based on morphological characters, the Shoebill was variously placed nearest pelicans, storks, or herons (Cracraft 1981, Mayr 2003, Livezey & Zusi 2007). Molecular phylogenetic studies now indicate that Shoebill is sister to Hamerkop and that these two families together constitute a clade that is sister to Pelecanidae (van Tuinen *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008), a hypothesis of relationship that is supported by morphological data (Mayr 2003, Mayr 2011).



Shoebill, *Balaeniceps rex*.
Uganda (Captive). © Kevin Schafer.





The Shoebill, also known as the shoe-billed stork or whalehead (as the family name suggests), actually moves more like a heron than a stork, with sudden transitions between motionless attention and rapid movements of the head and neck. The bright yellow eyes are oriented farther forward than in most wading birds, and to see them peering at you over the massive bill makes quite an impression. The name derives from the bill's shape like the front end of a boot, and the bill's prominent sharp hook helps snag lungfish, frogs, and other small vertebrates from the central African marshes in which the Shoebill lives. This capacious bill even serves for scooping up considerable quantities of water to douse the young in the nest on particularly hot days.



Shoebill, *Balaeniceps rex*. Mabamba Wetlands, Uganda. © Piotr Jonczyk.

*BALAENICEPS*
1 species



*B. rex*
Shoebill

Pelecaniformes

# PELECANIDAE
## Pelicans

1 genus • 8 species

**Related Families** Scopidae (Hamerkop), Balaenicipitidae (Shoebill)

**Similar Birds** Boobies (Sulidae), Shoebill (Balaenicipitidae), storks (Ciconiidae)

**Description**
- Plumage in most species predominantly white with distinct black wingtips; two species brown with white highlights
- Wings long, broad; tail short
- Body large, massive, cylindrical ovoid
- Bill very long, dorso-ventrally flattened, with terminal hook; extensive unfeathered, expandable gular pouch; mandible flexible; culmen with a horny knob during breeding season in *Pelecanus erythrorhyncos*
- Head oval-shaped, some species with short, shaggy crests; bare facial skin; nostrils vestigial; neck thick but long
- Legs short; feet totipalmate
- Sexes similar

**Habitat** Pelicans are found in a wide variety of aquatic habitats, including saline lakes, marshes, and coastal marine environments.

**Food** Pelicans feed almost entirely on fish, with some species taking a few crayfish. The mode of fishing varies. Brown and Peruvian Pelicans (*P. occidentalis* and *P. thagus*, respectively) plunge-dive from the air after spotting fish below the surface. The other species do not dive, but use their long necks to pursue and capture prey with their bucket-like mouths. Birds of these species often band together in foraging parties, driving small fish toward each other or into very shallow water. Typical prey range in size from small schooling fish such as anchovies and sardines to large fish such as carp, perch, and pike.

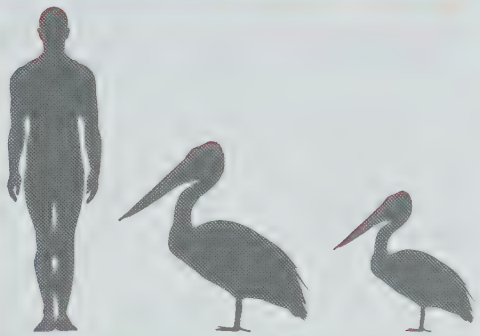
**Breeding** Pelicans are monogamous with biparental care. They are colonial nesters, with the largest colonies containing thousands of pairs. Nests placed on the ground are typically very simple structures, and can be no more than a scrape in the ground, sometimes with a rim of sand constructed around it. Species that nest in trees build sturdy stick platforms usually lined with softer material. Pelican clutches vary from 1 to 6 eggs, with clutches of 2 or 3 by far most common. Both sexes share in nest construction, incubation, and chick provisioning. The chicks hatch naked and asynchronously after 30 to 36 days of incubation, and they are brooded when necessary for the first two to three weeks, by which time they are well feathered with down and the first contour feathers. They fledge at about 75 to 80 days post-hatch, though some may be fed occasionally by the parents for another 20 days or so. Chicks of ground-nesting species often join a crèche where they are fed during much of their development.

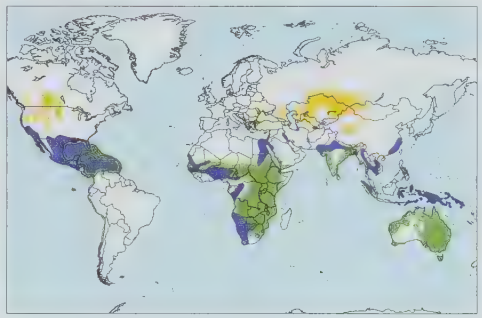


Brown Pelican, *Pelecanus occidentalis*.
Daytona Beach, Florida, USA. © Tom Johnson.



Australian Pelican, *Pelecanus conspicillatus*.
Shoalhaven Heads, New South Wales, Australia. © D. W. Winkler.





Often seen skimming low over the water in formation, pelicans also use their remarkable thermal soaring ability to commute, sometimes over 100 km each way, from resource-poor nesting areas to more productive fishing grounds. Pelicans use their flexible mandibles and greatly expanded gular pouches as hoop nets for capturing fish. These distinctive morphological adaptations are strictly for prey capture, not storage: once the water is drained out, pelicans usually swallow their precious prey, even while flying back to the nest to feed their young. The two brown pelican species are smaller, marine species that nest and forage along the coast. All the others are white or light gray with black in the wings, and breed around inland bodies of water.

**Conservation** Three of eight pelican species (38%) are of some conservation concern (1 VU, 2 NT). Humans are often responsible for disturbance at colonies, either collecting eggs or killing chicks, and pelicans are often persecuted for competing with fishermen. Numbers of Brown Pelicans in the United States declined drastically as a result of DDT-induced eggshell thinning, but they have largely recovered since that pesticide was banned.

**Relationships** Pelicans are part of Pelecaniformes, an order that previously included many families now assigned to Ciconiiformes or Suliformes. Molecular phylogenetic studies suggest that the morphological characters that seemed to unite the traditional Pelecaniformes—a bare gular pouch, lack of external nostrils, and totipalmate feet—have a more complex evolutionary history, and far less phylogenetic information content, than originally believed. Pelecanidae instead is in a clade with Scopidae and Balaenicipitidae (Mayr 2003, Ericson *et al.* 2006a, Mayr 2011), and these three families taken together are sister to the clade made up of Ardeidae plus Threskiornithidae (van Tuinen *et al.* 2001, Hackett *et al.* 2008).

*PELECANUS*
8 species



*P. erythrorhynchos*
American White Pelican

# Order: CATHARTIFORMES

## CATHARTIDAE
New World Vultures

5 genera · 7 species

Related Families Accipitridae (hawks), Sagittariidae (Secretarybird), Pandionidae (Osprey)

Similar Birds Old World vultures (Accipitridae), caracaras (Falconidae)

Description
- Plumage black or brown (white in *Sarcoramphus*)
- Wings long, broad; tail long, rounded;
- Body elongate ovoid; medium to large in size, though small relative to wing area
- Bill medium-short, rounded, and hooked at tip; nostrils perforate
- Head small, bare, often colorful; neck short to medium length
- Legs short, thick; toes fairly delicate with short nails
- Sexes similar in most species; in *Vultur*, males larger, with head comb and wattles

Habitat New World vultures range across all the habitats in their extensive Western Hemisphere distribution, from tropical rainforest to the high peaks of the Andes, tidal flats to desert canyons, grasslands, and savanna.

Food Cathartids are adapted to scavenging on dead vertebrates. Larger species feed on larger animals, as they are both dominant at carcasses and powerful enough to break into thicker skin. *Coragyps* will occasionally kill helpless prey such as lizards, insects, newborn livestock, bird nestlings, and hatchling sea turtles. *Sarcoramphus* and *Cathartes* species have excellent senses of smell, often locating dead animals through thick vegetation. The others rely on keen vision to find food.

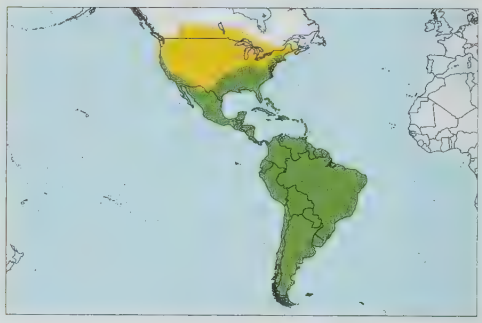
Breeding Cathartids appear to be monogamous with biparental care, though surprisingly little is known about the breeding biology of these birds. Indeed, the breeding of one South American species has never been described, and it is very poorly known for others. What we know of the northern species indicates that cathartids never make a nest and that they are quite variable in the sites they choose. Condor nests are generally inaccessible to mammalian predators, but the smaller vultures sometimes nest in surprisingly exposed situations, including caves, cliff ledges, holes in large trees, old nests of other raptors, and on the ground in rock crevices, beside logs, and underneath bushes. Larger species lay a single egg, and smaller species typically lay 2 eggs. After an incubation period of 40 to 55 days (longer in condors), the downy chicks hatch and are fed regurgitated food until they can fly—up to six months in condors—but the young are still tended by their parents for months later. Both parents, where known, incubate the eggs, brood chicks, and provision the young.

Conservation Two cathartid species (29%) are of conservation concern, both condors (1 NT, 1 CR). The critically endangered California Condor *Gymnogyps californianus* has been the subject of intensive management; in the 1980's, the total population was reduced to 22 individuals in the wild. All were taken into captivity for a breeding program. Birds raised from this pro-



Lesser Yellow-headed Vulture, *Cathartes burrovianus*. Usumacinta Marshes, Campeche, Mexico. © Ian Davies.





From the buoyant, tilting dihedrals of turkey vultures to the enormous flat and stable wings of Earth's largest soaring birds, the condors, these scavengers reveal their mastery of an energy-efficient lifestyle. All can traverse hundreds of kilometers without flapping once. So adept at finding the smallest currents in the air to stay aloft, they often seem hesitant to land. They may perch near a carcass for a day or more to be sure the animal is indeed dead and there are no predators waiting to take advantage of their relatively poor take-off abilities. Some species forage at low altitude and others from a higher vantage, depending on whether they rely primarily on vision or scent to spot dead animals.



American Black Vulture, *Coragyps atratus*. Buenos Aires, Argentina. © Ramón Casares.

gram are now re-established in the wild, and the population is slowly recovering. This species was often shot in the past, but the major remaining threat to this species is lead poisoning from bullets left in deer carcasses. The Andean Condor *Vultur gryphus* faces similar threats in South America.

**Relationships** While superficially similar to the Old World vultures, the cathartids are only distantly related to them, these groups representing a classic case of convergence on a similar body type from shared ecology. The taxonomic history of this group has been contentious. Early biochemical and DNA-DNA hybridization studies suggested that Cathartidae is sister to Ciconiidae (Sibley & Ahlquist 1990), but this vulture-stork relationship has been refuted by later studies based on DNA sequences (Wink *et al.* 1996, Fain & Houde 2004, Ericson *et al.* 2006a, Griffiths *et al.* 2007, Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014). These more recent analyses strongly suggest that Cathartidae falls instead within a group that includes Coraciiformes, Piciformes, Strigiformes, and Accipitriformes. Several recent large-scale analyses (Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014) place Cathartidae as sister to Accipitriformes. Given the other evidence for broader affinities elsewhere, we have retained cathartids in their own order for now.



Andean Condor, *Vultur gryphus*. Colca Canyon, Arequipa, Peru. © Marcelo Barreiros.

*CATHARTES*
3 species



*C. aura*
Turkey Vulture

*CORAGYPS*
1 species



*C. atratus*
American Black Vulture

*SARCORAMPHUS*
1 species



*S. papa*
King Vulture

*GYMNOGYPS*
1 species



*G. californianus*
California Condor

*VULTUR*
1 species



*V. gryphus*
Andean Condor

# Order: Accipitriformes

## Families: Sagittariidae, Pandionidae, Accipitridae

Accipitriformes, as recognized here, is composed of three families: the Secretarybird (Sagittariidae), the Osprey (Pandionidae), and the hawks (Accipitridae). These three families, until recently, had been placed together with the falcons and caracaras (Falconidae) and the New World vultures (Cathartidae) in the order Falconiformes. These families, however, have seen considerable recent changes in their systematic history. The DNA-DNA hybridization work of Sibley and Ahlquist (1990) indicated that the New World vultures were more closely related to the storks (Ciconiidae) and the rest of Ciconiiformes (*sensu lato*) than to the rest of the traditional Falconiformes (Hedges & Sibley 1994). More recent morphological and molecular analyses seem to support the traditional placement of the New World vultures near the Accipitridae, but poor node support creates doubt in their position, and we thus do not include them in Accipitriformes (Wink *et al.* 1996, Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008).

Traditionally, the falcons and caracaras have been considered closely related to the other diurnal raptors (Cracraft 1981, Sibley & Ahlquist 1990, Livezey & Zusi 2001). This position is based primarily on shared morphological characters. The only contrary opinion came from Jollie (1977), who suggested, on the basis of morphological characters, that the falcons were in fact not related to the other diurnal raptors, but closer to the parrots (Psittaciformes) and cuckoos (Cuculiformes). It was not until molecular sequence data began being used that this hypothesis gained ground again.

All of the recent large-scale phylogenetic studies, including Ericson *et al.* (2006a), Hackett *et al.* (2008), McCormack *et al.* (2013), and Jarvis *et al.* (2014), have found robust support for the removal of Accipitridae, Pandionidae, and Sagittariidae from Falconiformes. They found that Falconidae were in fact more closely related to the parrots (Psittaciformes) and the seriemas (Cariamidae) than to the other diurnal raptors. Despite this affinity, parrots and falcons are still only distantly related, and it would be inappropriate to place them in the same order. Thus, Falconidae is the sole family remaining in Falconiformes. Similar results were found by Griffiths *et al.* (2007) in their phylogeny of Accipitridae. They found that Falconidae was not related to the diurnal raptors, but instead grouped with the parrot outgroup. The remaining diurnal raptors are thus placed in a new order, Accipitriformes, a name already accepted by many checklists (Gill *et al.* 2009, Chesser *et al.* 2010, Clements *et al.* 2014).

Within this newly recognized Accipitriformes, Accipitridae is sister to Pandionidae, and these two families are in turn sister to Sagittariidae. Although current evidence places the New World vultures as sister to Accipitriformes, this relationship does not always receive strong support (Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014). Until relationships are better understood, we prefer to leave the New World vultures in their own order, Cathartiformes.

In recent large-scale phylogenies, Accipitriformes is part of the large and diverse "higher-landbird" group (Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014). Within this large group, Accipitriformes is part of a clade that includes the owls (Strigiformes), mousebirds (Coliidae), trogons (Trogonidae), and rollers and their allies (Coraciiformes). Accipitriformes, together with Cathartiformes, appears to be sister to the remaining families within this large clade (Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014).



Osprey, *Pandion haliaetus*. Bahía Kino, Sonora, Mexico. © D. W. Winkler.

Accipitriformes

# SAGITTARIIDAE
## Secretarybird

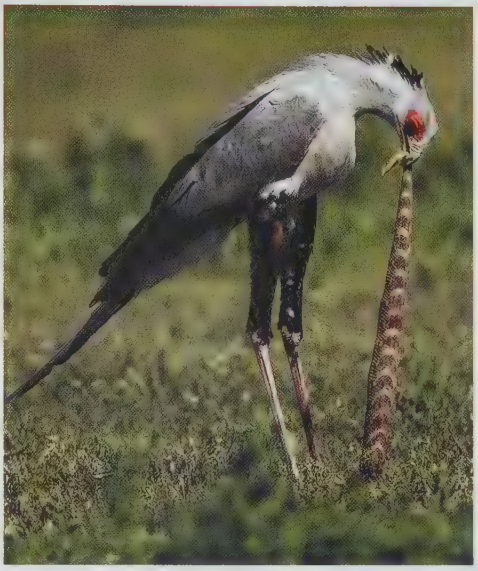
1 genus • 1 species

**Related Families** Pandionidae (Osprey), Accipitridae (hawks)

**Similar Birds** Crested eagles (Accipitridae), seriemas (Cariamidae)

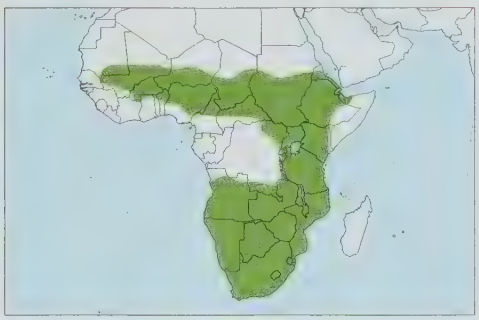
**Description**
- Plumage generally pale gray, with black flight feathers, thighs, and tail-band; distinct crest on the nape of long, paddle-shaped quills
- Wings long and broad; tail long, with central rectrices elongated
- Body large and slim, ovoid in shape, with upright carriage
- Bill short, sharply hooked
- Head small; face bare with bright red-orange skin; neck medium-long
- Legs very long, with thick overlapping scales; toes short, webbed at very bases
- Sexes similar; males larger than females

**Habitat** Secretarybirds live in almost any open habitat in sub-Saharan Africa, avoiding only the most dense forests and brush.



Secretarybird, *Sagittarius serpentarius*.
Lake Ndutu, Tanzania. © Francesco Veronesi.





On the African savannas, Secretarybirds walk like long-tailed eagles on stilts, hunting, on foot, everything from large insects to hares, but with a predilection for snakes. With their long strides but very soft footfall, they evince a hurried but delicate demeanor. It is thus all the more surprising to see them use the same long legs to kill a newly discovered prey item with swift kicks of their powerful short-toed feet. Snakes that are not so subdued are sometimes thrown into the air or dropped from aloft to complete the job. Named for their distinctive soft head plumes, which resemble old writing quills, Secretarybirds build stereotypically "raptorial" nests of sticks in the tops of small trees.

**Food** Secretarybirds are famous for hunting snakes in the open savanna; however, insects and other arthropods make up the majority of their diet. They use well-aimed kicks and stamps to kill or stun vertebrate prey, and the thick scales on their legs likely protect them from the bites of venomous snakes.

**Breeding** Secretarybirds are monogamous with biparental care. Nests consist of large, bulky stick nests built in the top of a tree (often an acacia) on the savanna. Females typically lay 1 to 3 eggs. Both the male and the female are active in nest construction, incubation, brooding, and chick provisioning. The downy chicks hatch asynchronously after 42 to 46 days of incubation, and only one young is usually raised to fledging, which takes place about 80 days after hatching. Food is brought back to the nest in the crop and regurgitated to the young unless the food item is very large. In addition to bringing food, adults will sometimes bring water to the chicks, which they also regurgitate. Fledged young remain with the adults for several weeks, and will roost in the nest for up to three months after fledging.

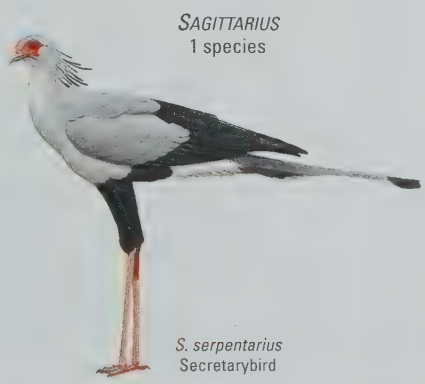
**Conservation** Secretarybirds face no pressing conservation threats. They are still common in many areas of Africa, even preferring some farmed areas to unaltered natural areas.

**Relationships** Sagittariidae fits well within Accipitriformes. Because of its unusual morphology, some early taxonomists placed the Secretarybird in Gruiformes, close to Cariamidae, but more recent morphological and genetic studies have consistently grouped it with the other diurnal raptors (Lerner & Mindell 2005, Griffiths *et al.* 2007, Livezey & Zusi 2007, Hackett *et al.* 2008), where the Secretarybird is most likely sister to the group that includes both Accipitridae and Pandionidae.



Secretarybird, *Sagittarius serpentarius*. Masai Mara Game Reserve, Kenya. © Con Foley.

*SAGITTARIUS*
1 species



*S. serpentarius*
Secretarybird

# PANDIONIDAE

## Osprey

1 genus • 1 species

**Related Families** Accipitridae (hawks)

**Similar Birds** Hawks and eagles (Accipitridae), caracaras (Falconidae), fishing owls (Strigidae)

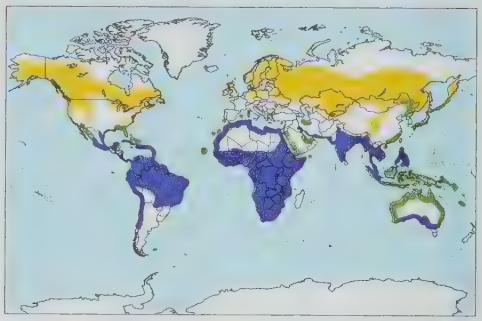
**Description**

- Plumage dark brown above, white below
- Wings long, narrow, seldom fully extended in flight; tail medium length, rounded
- Body medium-sized, fusiform
- Bill medium length, deep, and strongly hooked
- Head small with short shaggy crest on nape; neck medium length
- Legs long; outer toe reversible; sharp spicules on underside of foot and long strong claws on toes; legs feathered to toes
- Males smaller than females, with fewer dark markings on chest



Osprey, *Pandion haliaetus*.
Dirk Hartog Island, Western Australia. © G. B. Baker.





Ospreys have feet built for fishing, with spiny pads on strong and double-jointed toes for more effective gripping of fish. For people living along the water, the bulky stick nests atop trees, utility poles, or channel markers are familiar sights, as are Osprey fishing forays. Ospreys usually submerge only their legs in the water to make the catch, and then fly off to a feeding perch or hungry chicks with the fish lined up parallel to their body like an aircraft's auxiliary fuel tank. Sometimes, an Osprey will labor mightily to haul an overly large fish out of the water, only to rocket into the air the moment it gives up on its too-heavy prey.

**Habitat** Ospreys live at the shores of shallow waters, from coastal salt marshes to reservoirs and lakes far inland. During the breeding season they need dead trees or predator-free islands where they can build their large stick nests.

**Food** Osprey feed on fish, which are probably larger on average than the prey of other piscivores with which they occur. The only fish they do not take are those that never come near the surface or are too large to carry.

**Breeding** Ospreys are typically monogamous, but occasionally polygynous. Mated pairs usually return to the same nest year after year, especially if they successfully fledge young the year before. The nest is a shallow depression, often lined with soft vegetation, on top of a large, bulky platform of sticks and flotsam placed on a tree, on an artificial platform, or, more rarely, on the ground where predators are absent. Clutch size ranges from 2 to 4 eggs, with 3 being typical. Both male and female take part in nest construction and incubation. After being incubated for 34 to 43 days, the chicks hatch asynchronously, establishing a size hierarchy that can lead to fratricide. The chicks are fed by the female, who apportions food that is delivered to the nest by the foraging male. The chicks fledge after 44 to 59 days in the nest, but they remain in the territory of the parents for a month or two longer before setting off on their own.

**Conservation** Osprey populations have rebounded since the DDT-related declines of the mid-20th century, and ospreys currently face no immediate conservation concerns.

**Relationships** Molecular phylogenetic evidence confirms the long-held view that Pandionidae is sister to Accipitridae. It would thus be easy to justify merging it into the latter family, but this bird is sufficiently distinctive in its morphology and habits that we have opted not to. The clade of Pandionidae plus Accipitridae is sister to Sagittariidae (Lerner & Mindell 2005, Ericson *et al.* 2006a, Griffiths *et al.* 2007, Hackett *et al.* 2008).



Osprey, *Pandion haliaetus*. Myakka River State Park, Florida, USA. © Murat Cuhadaroglu.

*PANDION*
1 species



*P. haliaetus*
Osprey

Accipitriformes

# ACCIPITRIDAE

Hawks

69 genera • 248 species

**Related Families** Pandionidae (Osprey)

**Similar Birds** New World vultures (Cathartidae), Osprey (Pandionidae), falcons and caracaras (Falconidae)

**Description**

- Plumage highly variable, often with dark earth-toned or gray upperparts and lighter streaked or barred underparts
- Wings short to long, typically broad and rounded; tail short to long, generally square-tipped
- Body small to large, cylindrical ovoid
- Bill short, with hooked tip; cere and orbital skin bare, often colorful
- Head with forward-facing eyes; neck short
- Legs and feet medium length, thick; claws long, sharp, and often strongly hooked
- Females larger than males; plumage usually similar, but dimorphic in some species

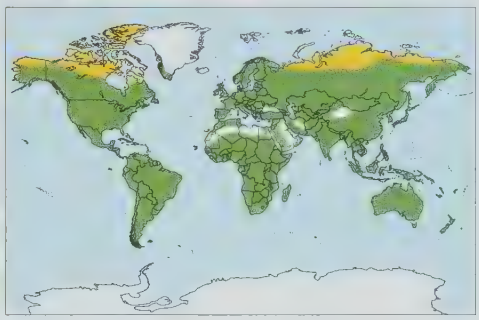
**Habitat** The accipitrids occupy virtually all terrestrial habitats, including Arctic tundra, desert, savanna, and forests of all types.

**Food** Almost all accipitrids are carnivorous, feeding on a wide variety of prey items. Many species specialize on specific vertebrate groups, such as fish, birds, reptiles (especially snakes in some groups), and mammals, whereas other species specialize on invertebrate prey, including snails, insects, and crustaceans. The Palm-nut Vulture *Gypohierax angolensis* distinctively feeds mostly on oil palm fruit. Other specialized diets include the honey buzzards (*Pernis*), which feed on the larvae of wasps and bees, the Snail Kite *Rostrhamus sociabilis*, which specializes on apple snails, and the Rufous Crab-hawk *Buteogallus aequinoctialis*, which specializes on crabs. The Old World vultures are famous scavengers, but the Egyptian Vulture *Neophron percnopterus* breaks open ostrich eggs by throwing rocks at them, and the Bearded Vulture *Gypaetus barbatus* drops the long bones of vertebrates from great heights to extract the marrow within.



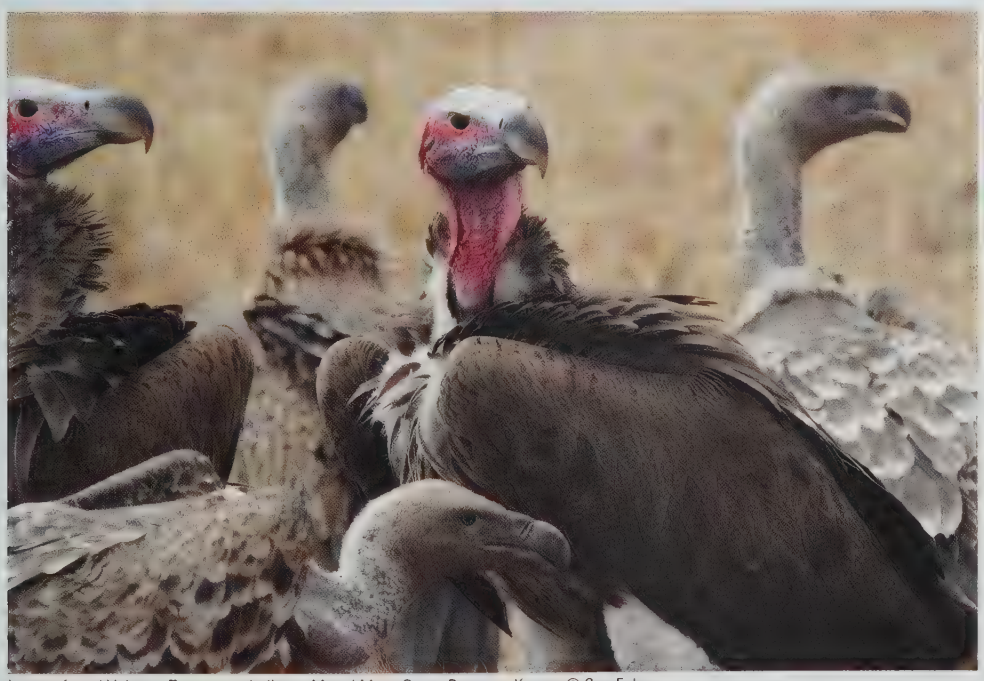
Roadside Hawk, *Rupornis magnirostris*. Buenos Aires, Argentina. © Ramón Casares.





One of the few truly cosmopolitan groups—absent only from Antarctica—these birds with their strongly hooked bills and long, strong talons are deeply symbolic in many cultures. Their flight styles are diverse, from the languid soaring of buteos to the deft maneuvering of woodland accipiters or the hovering hunt of a kite, and the morphology of their wings and tails varies accordingly. Although most accipitrids subsist on generalized diets of other smaller vertebrates, some are remarkably specialized, feeding primarily on bird nestlings, monkeys, snails, wasps, palm fruit, or bone marrow. Many are long-distance diurnal migrants, and their large concentrations as they funnel through isthmuses and peninsulas during migration provide an exquisite spectacle for observers below.

**Breeding** The majority of hawks and eagles are monogamous with biparental care. However, some species are regularly cooperative breeders. In the Galapagos Hawk *Buteo galapagoensis*, birds are cooperatively polyandrous, one female mating with two to seven males, all of which help feed the young. Some hawks are also polygynous, with males having a "primary" nest to which they bring more food than their "secondary" nests. Nests of the accipitrids are generally a platform of sticks, usually with a cup lined with finer material, larger in larger species. Nest sites vary from species to species, with some nesting mostly on the ground, in trees, on cliffs, or on a variety of manmade structures. Nests can often be reused year after year by the same pair, often with new material added each year. Clutch size ranges from 1 to 6 eggs; smaller species living farther from the equator tend to have the largest clutches. Both males and females contribute to nest construction, and the sexes share in incubation duties, often with the female incubating the eggs while the male brings her food. The chicks hatch asynchronously after an incubation period of 28 to 60 days (longest in the largest eagles and vultures), and brood reduction through fratricide is widespread. Males generally take the larger role in provisioning the nestlings except in vultures, where the division of labor is more even. In cooperatively breeding species, most helpers contribute to feeding nestlings. The nestling period varies from as little as 25 days in the smallest species to over 140 days in the largest, and the duration of post-fledging parental care varies from two weeks to a year.



Lappet-faced Vulture, *Torgos tracheliotos*. Masai Mara Game Reserve, Kenya. © Con Foley.

**Conservation** At least 84 accipitrid species (34%) have been affected by habitat destruction and degradation, but these birds confront

special threats as well (34 NT, 27 VU, 13 EN, 10 CR). As top-chain predators, they are often persecuted by farmers, and they also are subject to poisons concentrated in their prey. Several species have been adversely affected by pesticides in the past, and populations have generally rebounded when use of the offending pesticides was curtailed. A special case has arisen in the vultures of Asia, where the use of the drug diclofenac as an anti-inflammatory in livestock has taken an unforeseen toll on birds. Vultures and eagles appear to have extreme sensitivity to this drug in small concentrations in their food. Populations of several vulture species have plummeted by 99.9% in several cases, and the disappearance of vultures has led to dramatic increases in feral dogs, disease, and urban leopard attacks. The drug is beginning to be prescribed for livestock in Europe, despite the availability of alternative drugs. Seldom are conservation threats so direct and their solutions so obvious.

Relationships Accipitridae is sister to Pandionidae, and these two taken together are sister to Sagittariidae (Lerner & Mindell 2005, Ericson *et al.* 2006a, Griffiths *et al.* 2007, Hackett *et al.* 2008). Recent studies of relationships within Accipitridae agree about many of the subgroups within this impressive radiation (Riesing *et al.* 2003, Lerner & Mindell 2005, Griffiths *et al.* 2007). The elanine kites (including *Elanus* and *Gampsonyx*) in Subfamily Elaninae are usually found to be sister to the remaining accipitrids. The pernine kites group together with some of the Old World vultures (*Gypaetus*, *Neophron*), and the harrier-hawks (*Polyboroides*) in Subfamily Gypaetinae, which is sister to the remaining members of the family in Subfamily Accipitrinae.



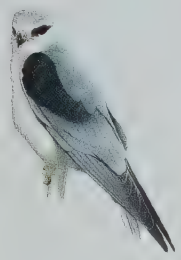
Martial Eagle, *Polemaetus bellicosus*. Kruger NP, South Africa. © Con Foley.



Oriental Honey Buzzard, *Pernis ptilorhynchus*. Hessarghatta, Bengaluru, Karnataka, India. © Varun HB.

## Subfamily ELANINAE

*ELANUS*
4 species



*E. caeruleus*
Black-winged Kite

*GAMPSONYX*
1 species



*G. swainsonii*
Pearl Kite

*CHELICTINIA*
1 species



*C. riocourii*
Scissor-tailed Kite

## Subfamily GYPAETINAE
## Tribe Pernini

*LEPTODON*
2 species



*L. cayanensis*
Gray-headed Kite

*CHONDROHIERAX*
2 species



*C. uncinatus*
Hook-billed Kite

*ELANOIDES*
1 species



*E. forficatus*
Swallow-tailed Kite

*PERNIS*
4 species



*P. apivorus*
European Honey Buzzard

*HAMIROSTRA*
1 species



*H. melanosternon*
Black-breasted Buzzard

*LOPHOICTINIA*
1 species



*L. isura*
Square-tailed Kite

*HENICOPERNIS*
2 species



*H. longicauda*
Long-tailed Honey Buzzard

*AVICEDA*
5 species



*A. subcristata*
Pacific Baza

*EUTRIORCHIS*
1 species



*E. astur*
Madagascar Serpent-eagle

## Tribe Gypaetini

*POLYBOROIDES*
2 species



*P. radiatus*
Madagascar Harrier-hawk

*GYPOHIERAX*
1 species



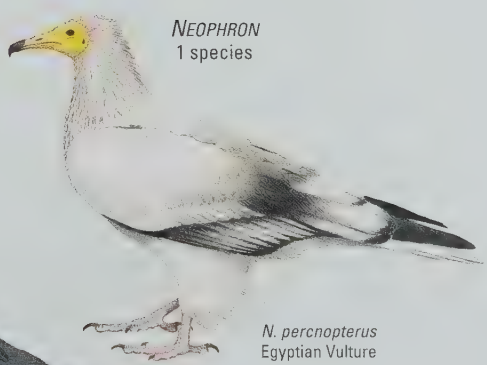
*G. angolensis*
Palm-nut Vulture

*GYPAETUS*
1 species



*G. barbatus*
Bearded Vulture

*NEOPHRON*
1 species



*N. percnopterus*
Egyptian Vulture

Subfamily **Accipitrinae** (1 of 4)

Tribe **Circaetini**

*Spilornis*
6 species



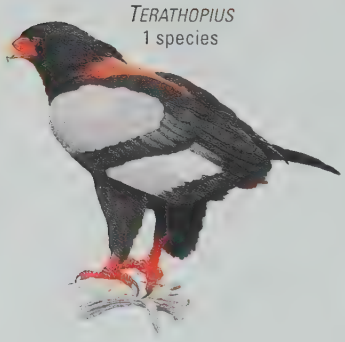
*S. cheela*
Crested Serpent-eagle

*Dryotriorchis*
1 species



*D. spectabilis*
Congo Serpent-eagle

*Terathopius*
1 species



*T. ecaudatus*
Bateleur

*Pithecophaga*
1 species



*P. jefferyi*
Philippine Eagle

*Circaetus*
6 species



*C. gallicus*
Short-toed Snake-eagle

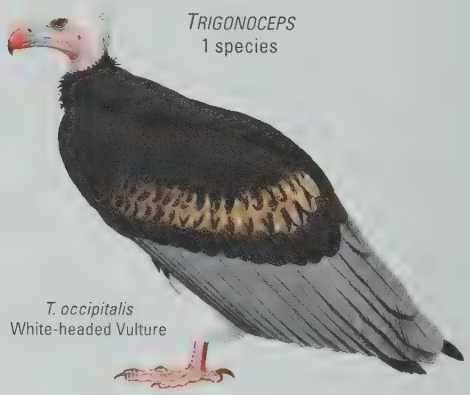
Tribe **Gypini**

*Sarcogyps*
1 species



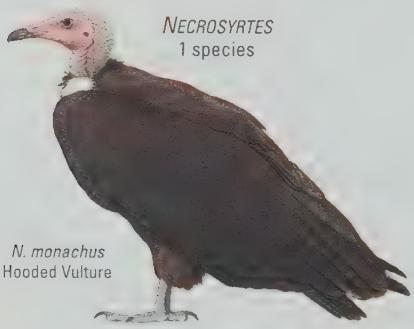
*S. calvus*
Red-headed Vulture

*Trigonoceps*
1 species



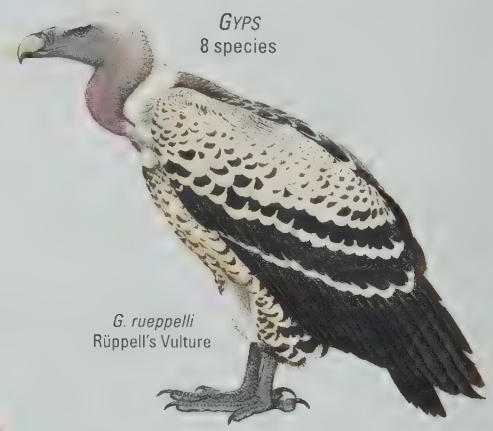
*T. occipitalis*
White-headed Vulture

*Necrosyrtes*
1 species



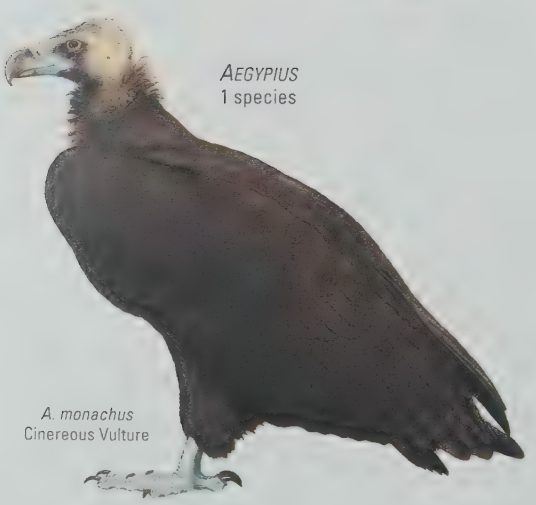
*N. monachus*
Hooded Vulture

*Gyps*
8 species



*G. rueppelli*
Rüppell's Vulture

*Aegypius*
1 species



*A. monachus*
Cinereous Vulture

*Torgos*
1 species



*T. tracheliotos*
Lappet-faced Vulture

*Macheiramphus*
1 species



*M. alcinus*
Bat Hawk

*Harpyopsis*
1 species



*H. novaeguineae*
Papuan Eagle

*Morphnus*
1 species



*M. guianensis*
Crested Eagle

*Harpia*
1 species



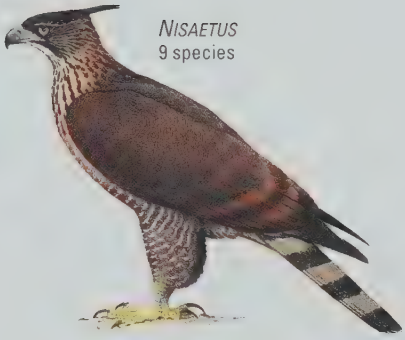
*H. harpyja*
Harpy Eagle

*Stephanoaetus*
1 species



*S. coronatus*
Crowned Eagle

*Nisaetus*
9 species



*N. nipalensis*
Mountain Hawk-eagle

*Lophotriorchis*
1 species



*L. kienerii*
Rufous-bellied Eagle

*Polemaetus*
1 species



*P. bellicosus*
Martial Eagle

*Spizaetus*
4 species



*S. ornatus*
Ornate Hawk-eagle

*Ictinaetus*
1 species



*I. malaiensis*
Black Eagle

*Lophaetus*
1 species



*L. occipitalis*
Long-crested Eagle

Subfamily **Accipitrinae** (3 of 4)

Tribe **Accipitrini** (2 of 3)

*Clanga*
3 species



*C. clanga*
Greater Spotted Eagle

*Aquila*
11 species



*A. chrysaetos*
Golden Eagle

*Hieraaetus*
5 species



*H. pennatus*
Booted Eagle

*Kaupifalco*
1 species



*K. monogrammicus*
Lizard Buzzard

*Melierax*
3 species



*M. metabates*
Dark Chanting-goshawk

*Micronisus*
1 species



*M. gabar*
Gabar Goshawk

*Harpagus*
2 species



*H. bidentatus*
Double-toothed Kite

*Circus*
16 species



*C. cyaneus*
Hen Harrier

*Accipiter*
48 species



*A. gentilis*
Northern Goshawk

*Erythrotriorchis*
2 species



*E. radiatus*
Red Goshawk

*Megatriorchis*
1 species



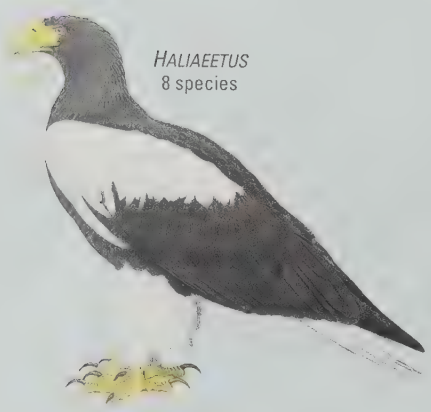
*M. doriae*
Doria's Goshawk

*Urotriorchis*
1 species



*U. macrourus*
Long-tailed Hawk

*Haliaeetus*
8 species



*H. pelagicus*
Steller's Sea-eagle

*Icthyophaga*
2 species



*I. ichthyaetus*
Gray-headed Fish-eagle

*Haliastur*
2 species



*H. indus*
Brahminy Kite

*Milvus*
2 species



*M. milvus*
Red Kite

*Busarellus*
1 species



*B. nigricollis*
Black-collared Hawk

*Geranospiza*
1 species



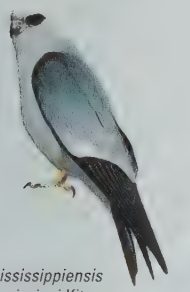
*G. caerulescens*
Crane Hawk

*Butastur*
4 species



*B. indicus*
Gray-faced Buzzard

*Ictinia*
2 species



*I. mississippiensis*
Mississippi Kite

*Rostrhamus*
1 species



*R. sociabilis*
Snail Kite

*Helicolestes*
1 species



*H. hamatus*
Slender-billed Kite

*Rupornis*
1 species



*R. magnirostris*
Roadside Hawk

*Parabuteo*
2 species



*P. unicinctus*
Harris's Hawk

*Cryptoleucopteryx*
1 species



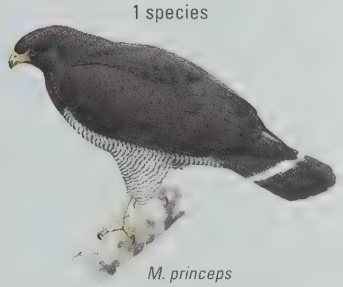
*C. plumbea*
Plumbeous Hawk

*Buteogallus*
9 species



*B. urubitinga*
Great Black Hawk

*Morphnarchus*
1 species



*M. princeps*
Barred Hawk

*Geranoaetus*
3 species



*G. melanoleucus*
Black-chested Buzzard-eagle

*Pseudastur*
3 species



*P. albicollis*
White Hawk

*Leucopternis*
3 species



*L. melanops*
Black-faced Hawk

*Buteo*
27 species



*B. augur*
Augur Buzzard

# Order: STRIGIFORMES

## Families: Strigidae, Tytonidae

The two families of this order, the barn owls (Tytonidae) and the typical owls (Strigidae), have long been considered to be sister groups and very closely related (Cracraft 1981, Livezey & Zusi 2001, Livezey & Zusi 2007, Hackett *et al.* 2008, Wink *et al.* 2009). However, the placement of Strigiformes as an order has been a source of some disagreement. On the basis of very general morphological characters, the owls were long thought to be closely related to Caprimulgiformes, another group of largely nocturnal birds (Livezey & Zusi 2001). Other analyses, especially of foot morphology, indicate a close relationship between owls and diurnal birds of prey, Accipitriformes and/or Falconiformes (Cracraft 1981, Livezey & Zusi 2007). Recent studies using DNA sequence data indicate that Strigiformes is less close to Caprimulgiformes than it is to the diurnal raptors, and closer to Accipitriformes than to Falconiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008, Jarvis *et al.* 2014). Hackett *et al.* (2008) suggested Strigiformes as sister to mousebirds (Coliiformes), and these together as sister to a large clade including Cuckoo-roller (Leptosomiformes), trogons (Trogoniformes), and the woodpecker/roller/hornbill clade (Piciformes/Coraciiformes/Bucerotiformes). Jarvis *et al.* (2014) recovered a very similar result, with Strigiformes sister to the clade formed by Coliiformes plus all these other groups. McCormack *et al.* (2013), recovered a similar topology to Jarvis *et al.* (2014), but in their study mousebirds were not always part of the sister clade.



Snowy Owl, *Bubo scandiacus*. Plymouth Beach, Massachusetts, USA. © Ian Davies.

Strigiformes

## STRIGIDAE
Owls

26 genera • 220 species

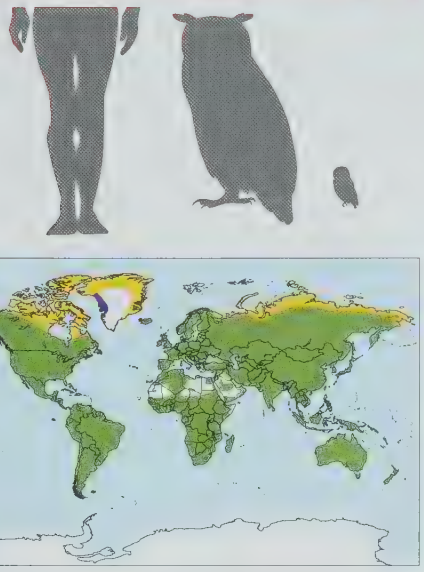
**Related Families** Tytonidae (barn owls)

**Similar Birds** Barn owls (Tytonidae), owlet-nightjars (Aegothelidae)

**Description**
- Plumage soft and cryptically patterned; shades of brown and gray predominant; flank feathers elongated
- Wings medium length, broad, and rounded; edges of primary and secondary remiges fringed; tail medium length
- Body cylindrical ovoid, small to large
- Bill short, deep, hooked, with cere at base
- Head large, rounded, with distinctive facial disk; eyes large, facing forward; "ear-tufts" atop head common
- Legs medium length, with feathered tarsi; toes thick with long, sharp-curved claws
- Sexes similar; females generally larger than males



Tropical Screech-owl, *Megascops choliba*.
San Antonio de Areco, Buenos Aires, Argentina. © Ramón Casares.



Archetypal birds of the night, these keen predators have evolved numerous adaptations to nocturnal hunting: acutely sensitive ears, including asymmetrical ear openings in some species, to help localize prey by sound alone; wing feathers with fringed edges that make their flight silent; forward-pointing eyes on a flat facial disk, enabling binocular vision and increasing the incoming light and sound; and the ability to swivel their heads 270 degrees. They have very strong and robust feet and legs, with a fourth, reversible, toe that is as often held behind as in front of the perch.

**Habitat** Owls occupy almost all terrestrial habitats, from Arctic tundra to tropical rainforest, and from sea level up to elevations of 4700 m.

**Food** All owls are exclusively carnivorous. Smaller species take large numbers of insects, but most include vertebrates in their diet, the larger species exclusively. Many are quite generalized, but *Ketupa* and *Scotopelia* species eat almost entirely fish. Although most owls are nocturnal hunters, the species nesting in the high Arctic as well as species of *Glaucidium* and *Surnia* are primarily diurnal hunters. *Glaucidium* species are particularly adept at catching birds on the wing. Most nocturnal owls hunt largely by ear, but crepuscular species like Short-eared Owl *Asio flammeus* may use both sight and sound as they fly low in search of prey. Whenever prey items have a large amount of fur or bones, the undigested parts are regurgitated as a pellet.

**Breeding** The majority of owls are monogamous with biparental care, with polygyny being reported in several species in years of high prey abundance. In the best-studied species, cases of serial polyandry are known, but these appear to be quite rare. Owls generally do not make a nest, whether laying on the ground or a cliff ledge, or in a bird nest built by another species, a tree cavity, or a rodent burrow. Occasionally a bit of lining will be added before the eggs are laid. Small species and the large species that feed on bigger mammals or fish generally lay clutches of 2 to 4 eggs, and those of the mid-sized species that feed predominantly on rodents can lay larger clutches, often of 7 eggs and occasionally up to 9 eggs. The female alone incubates the eggs, for a period of three to four weeks, and broods the chicks once they hatch, the male bringing food to the female throughout these stages. The chicks often hatch asynchronously, setting the stage for brood reduction and fratricide. As the chicks grow, the female gradually begins to leave them alone and starts taking a near-equal share in provisioning the older chicks. The chicks of many species spread out from the nest well before they can fly, spreading the risk of predation but challenging the parents to keep track of and feed individual chicks. This habit makes it hard to designate the age at fledging and independence, but it appears that young of



Short-eared Owl, *Asio flammeus*. Notsuke Hanto, Japan. © Con Foley.

the large owl species may be dependent on the parents for up to five months post-hatch.

**Conservation** At least 64 species of owls (29%) are at risk (26 NT, 23 VU, 8 EN, 7 CR), and those in greatest danger are species with limited ranges, including island endemics in *Otus* and *Ninox*. Birds with limited ranges are less able to sustain population declines, and the primary threat faced by all owls is habitat destruction, usually in the form of deforestation. One exceptional case is the Forest Owlet *Heteroglaux blewitti*, a species that was recently rediscovered in scattered and tiny remnants of forest habitat in India after over 100 years of no reports.

**Relationships** Strigidae is part of Strigiformes together with its sister family, Tytonidae. Recent molecular phylogenies have found that Strigidae is part of a group of higher landbirds (Ericson *et al.* 2006a, Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014), though its position has not been completely resolved. These recent studies indicate that within this clade, Strigidae may be sister to Coliidae (Hackett *et al.* 2008), or sister to a clade that includes Coraciiformes, Piciformes, and Trogoniformes (McCormack *et al.* 2013, Jarvis *et al.* 2014). Within Strigidae, species-level relationships have not been well resolved, but species group into several major clades. The genera *Ninox* and *Uroglaux*, which constitute the subfamily Ieraglaucinae, are sister to the remaining owls in Surniinae and Striginae (Wink *et al.* 2009).



Spotted Owlet, *Athene brama*. Coimbatore, Tamil Nadu, India. © Varun HB.

Subfamily **IERAGLAUCINAE**

*NINOX*
37 species



*N. boobook*
Southern Boobook

*UROGLAUX*
1 species



*U. dimorpha*
Papuan Boobook

Subfamily **SURNIINAE**

*SURNIA*
1 species



*S. ulula*
Northern Hawk-owl

*GLAUCIDIUM*
32 species



*G. brasilianum*
Ferruginous Pygmy Owl

*XENOGLAUX*
1 species



*X. loweryi*
Long-whiskered Owlet

*MICRATHENE*
1 species



*M. whitneyi*
Elf Owl

*ATHENE*
4 species



*A. noctua*
Little Owl

*HETEROGLAUX*
1 species



*H. blewitti*
Forest Owlet

*AEGOLIUS*
4 species



*A. funereus*
Boreal Owl

*OTUS*
53 species



*O. spilocephalus*
Mountain Scops-owl

*PYRROGLAUX*
1 species



*P. podargina*
Palau Owl

*PTILOPSIS*
2 species



*P. granti*
Southern White-faced Owl

*ASIO*
7 species



*A. flammeus*
Short-eared Owl

*PSEUDOSCOPS*
1 species



*P. grammicus*
Jamaican Owl

*NESASIO*
1 species



*N. solomonensis*
Fearful Owl

*PSILOSCOPS*
1 species



*P. flammeolus*
Flammulated Owl

*MEGASCOPS*
22 species



*M. watsonii*
Tawny-bellied Screech-owl

*MARGAROBYAS*
1 species



*M. lawrencii*
Bare-legged Screech-owl

*PULSATRIX*
3 species



*P. perspicillata*
Spectacled Owl

*STRIX*
16 species



*S. uralensis*
Ural Owl

*JUBULA*
1 species



*J. lettii*
Maned Owl

*LOPHOSTRIX*
1 species



*L. cristata*
Crested Owl

*BUBO*
18 species



*B. ascalaphus*
Pharaoh Eagle-owl

*KETUPA*
3 species



*K. flavipes*
Tawny Fish-owl

*SCOTOPELIA*
3 species



*S. peli*
Pel's Fishing-owl

*CICCABA*
4 species



*C. nigrolineata*
Black-and-white Owl

Strigiformes

# TYTONIDAE
## Barn Owls

2 genera • 16 species

Related Families Strigidae (owls)

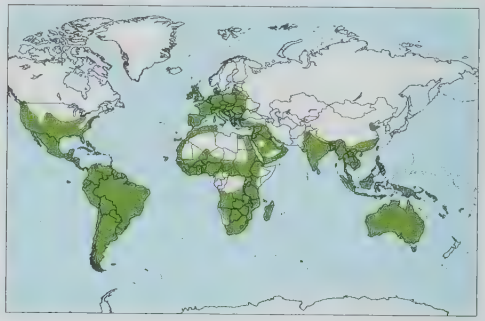
Similar Birds Owls (Strigidae)

Description
- Plumage cryptic, predominantly white, gray, and brown, paler on face and undersides
- Wings long, rounded; tail short
- Body medium-sized, cylindrical ovoid, but slighter of build than in strigids
- Bill medium length, less robust than in strigids, hooked
- Head large, flat-fronted; prominent heart-shaped facial disc with stiff bristles; eyes dark and relatively small for an owl
- Legs long, tarsus completely feathered; feet lightly feathered with long relatively slender toes and claws with shallow curve
- Sexes generally similar; females typically larger, darker than males



Barn Owl, *Tyto alba*.
Perak, Malaysia. © Con Foley.





Habitat The barn owls occupy a wide variety of habitats worldwide, ranging from desert to dense tropical rainforest, but they generally do not venture into environments as cold or harsh as those some strigids occupy.

Food Tytonids feed most frequently on small rodents, with smaller numbers of birds, reptiles, fish, amphibians, and insects also taken. Barn owls are strongly nocturnal and hunt primarily by ear, with an extraordinary ability to pinpoint the location of prey by sound. They generally eat their prey whole and regurgitate dense pellets of non-digested fur and bone.

Breeding Barn owls are typically monogamous (rarely polygynous) with biparental care. Most species nest in cavities in trees, caves, cliffs, or buildings, though a couple of species build a grass nest on the ground. Cavity nests are often little more than a mass of cast pellets, upon which the eggs are laid. Females lay 1 to 14 eggs, with 4 to 7 being most common (larger clutches in years of high rodent populations); clutches are generally smaller in the tropical species. Females are typically the only ones to incubate the eggs through an incubation period of four to six weeks, and the chicks hatch asynchronously, with brood size hierarchies common. Both male and female feed the chicks, which appear to reach fledging age at 70 to 90 days post-hatch.

Conservation The tytonid species of greatest conservation concern (31%) have very limited ranges; this puts them at greater risk from habi-

The well-known Barn Owl serves as strong contrast to the ten or so similar species that are very little known: most of these occur in limited ranges on various tropical islands, and for eight the breeding biology is essentially unknown. The lighter build and longer legs of tytonids, compared to strigids, seems to suit them better to warmer climes. All of these birds share a heart-shaped facial disk, which collects sound waves, and, as in some strigids, asymmetrical ear openings, adaptations for night hunting. Their calls, often given in flight, are more hiss or scream than hoot. Everywhere, they apparently subsist on large numbers of small rodents, and the Barn Owl has a remarkable capacity to adjust its reproductive output to variation in its food supply.



Eastern Grass Owl, *Tyto longimembris*. Tyto Wetlands, Ingham, Queensland, Australia. © Tony Ashton.

tat destruction than wider-ranged species would be (3 VU, 2 EN).

**Relationships** Strigiformes comprises Tytonidae plus Strigidae. Together these families are part of a clade of higher landbirds that includes Coliiformes, Coraciiformes, and Piciformes (Ericson *et al.* 2006a, Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014). The exact relationship of the barn owls relative to these other groups is not yet well resolved. The Tytonidae are subdivided into two clades, the first subfamily comprising all *Tyto* barn and grass owl species and the second subfamily the two species of bay owls, in the genus *Phodilus* (Wink *et al.* 2009).



Barn Owl, *Tyto alba*. Norfolk, United Kingdom. © Francesco Veronesi.



Barn Owl, *Tyto alba*. Near Wyszków, Mazovia, Poland. © Paweł Wacławik.

### Subfamily PHODILINAE

*PHODILUS*
3 species



*P. badius*
Oriental Bay Owl

### Subfamily TYTONINAE

*TYTO*
13 species



*T. glaucops*
Ashy-faced Owl

# Order: COLIIFORMES

## COLIIDAE
Mousebirds

2 genera · 6 species

**Related Families** Unclear, many dozens of families in clades including Leptosomiformes, Trogoniformes, Bucerotiformes, Piciformes, Coraciiformes, Falconiformes, Psittaciformes and Passeriformes

**Similar Birds** Silky flycatchers (Ptiliogonatidae), bulbuls (Pycnonotidae), cuckoos (Cuculidae)

**Description**
- Plumage soft, dull buff-brown, some with small patches of bright color
- Wings short, rounded; tail extremely long, slender, graduated, with stiff shafts
- Body small, ovoid
- Bill short, deep and inflated, slightly decurved and hooked; cere brightly colored in some species
- Head medium-sized, with short, fluffy crest; neck short, thick
- Legs short; toes long with versatile joints
- Sexes similar

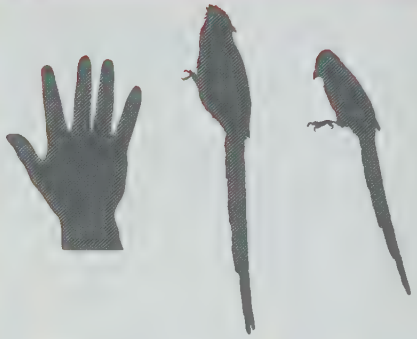
**Habitat** Mousebirds live in savanna, acacia scrubland, open woodland, and suburban gardens, avoiding dense forest.

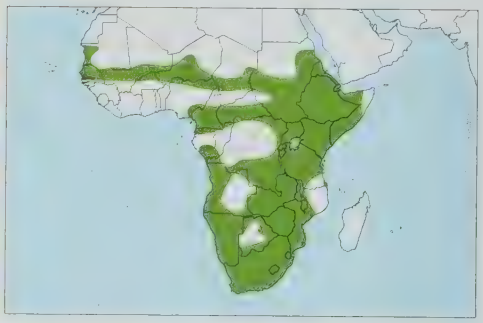
**Food** Coliids feed mainly on fruit, but will also take leaves, buds, and shoots. They can maintain their body mass on a strict diet of leaves, but they readily switch to fruit when it is available. At least one study (Downs *et al.* 2000) indicates that some fermentation of leaves by microbial symbionts occurs in the foregut of mousebirds.

**Breeding** Mousebirds are monogamous, usually breeding cooperatively with helpers that are offspring of the breeding pair from previous years. Mousebirds are social throughout the year outside the family group, and they often nest in loose colonies. Nests are placed in a bush or a tree and consist of simple cups of twigs and stems, often lined with green leaves, hair, moss, lichen, and spiderwebs. Females typically lay 2 or 3 small eggs. Both male and female, and any helpers present, are active in all aspects of parental care, from nest construction to incubation and feeding of the young. The young hatch asynchronously after only 12 days of incubation, near-naked and with eyes closed, and they are brooded for much of their nestling lives by one



Blue-naped Mousebird, *Urocolius macrourus*. Samburu Reserve, Kenya. © Francesco Veronesi.





Highly social birds with fast direct flight, mousebirds move in flocks from shrub to shrub in African woodlands and savannas, hurtling into leaves and branches directly without slowing down. When temperatures are low and food is scarce, these stocky, mouse-brown birds with small crests and long graduated tails can go into torpor, and they often huddle in large extended-family groups in cold and wet weather. Mousebirds often perch like other birds atop a branch, but they are just as likely to hang from a branch, using very versatile toes (two, three, or four toes forward!). They often go so far as to hang on with one foot while manipulating food with the other. They also often run crouched, mouse-like, along a branch with the body parallel to it.



Speckled Mousebird, *Colius striatus*. The Ark, Aberdares NP, Kenya. © Nick Athanas.

of the parents. The chicks leave the nest and can fly at about 2.5 weeks post-hatch, but they still have a lot of growth and development left, and are fed by the others in their group for up to six weeks longer.

**Conservation** The mousebirds face no immediate conservation concerns.

**Relationships** The phylogenetic placement of mousebirds has long been controversial, and their relationships remain ambiguous despite their inclusion in many recent phylogenetic studies. Analyses based on morphology have suggested affinities either to Trogonidae (Livezey & Zusi 2007) or to a larger group of landbirds including Coraciiformes, Rallidae, Passeriformes, Psittacidae, and Caprimulgiformes (Cracraft 1981, Livezey & Zusi 2001). Recent molecular studies are equally inconsistent, variously linking Coliidae with the Coraciiformes and Trogonidae (Ericson *et al.* 2006a), or placing it as sister group to Strigiformes (Hackett *et al.* 2008) or as sister to a clade made up of Leptosomiformes, Trogoniformes, Bucerotiformes, Piciformes, and Coraciiformes (McCormack *et al.* 2013, Jarvis *et al.* 2014). McCormack *et al.* (2013) also suggested another possible relationship, as sister to a clade that includes Falconidae, Psittacidae, and the Passeriformes, but this relationship was not well supported. Because they are well differentiated from these other groups and not clearly allied to any of them, mousebirds remain the sole family in Coliiformes.



Speckled Mousebird, *Colius striatus*. Addis Ababa, Ethiopia. © Ian Davies.



# Order: LEPTOSOMIFORMES

## LEPTOSOMIDAE
Cuckoo-roller

1 genus • 1 species

**Related Families** Most likely all those in Trogoniformes, Bucerotiformes, Piciformes, and Coraciiformes

**Similar Birds** Cuckoos (Cuculidae), cuckoo-shrikes (Campephagidae), ground-rollers (Brachypteraciidae), rollers (Coraciidae)

**Description**
- Male pale gray and black, female brown with lighter spots and bars
- Wings long, rounded; tail long, square-tipped
- Body cylindrical ovoid, medium-sized
- Bill medium length, moderately deep and finely hooked
- Head very large, with short crest and small eyes placed far back and high in face; neck short
- Legs very short; toes narrow, short, with third toe reversible
- Females larger than males

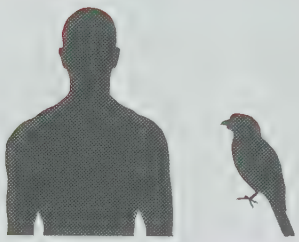
**Habitat** Cuckoo-rollers are inhabitants of tropical and subtropical forests, parklands, and even agricultural areas.

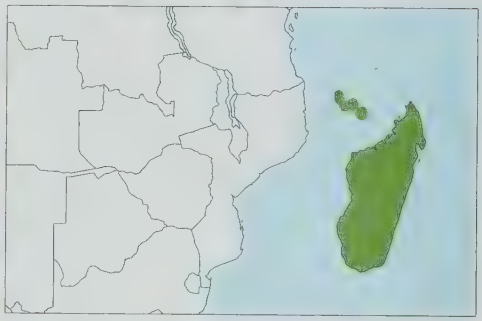
**Food** The diet of *Leptosomus* consists of large invertebrates (especially caterpillars, cicadas, and grasshoppers) and small vertebrates (particularly chameleons and geckos). Cuckoo-rollers forage mainly by sitting and waiting, making short sallying flights out to snatch prey.

**Breeding** The scarce evidence available suggests that Cuckoo-rollers are monogamous with biparental care, and that breeding pairs may stay together for much of the year. Cuckoo-rollers nest in natural tree cavities, and the clutch of 4 or 5 eggs is laid directly on the cavity floor, without any further nest. The female alone, provisioned by the male, incubates the eggs throughout an incubation period of about 20 days. The chicks hatch with long white down, and both male and female feed them until they fledge at about 30 days post-hatch.



Cuckoo-roller, *Leptosomus discolor*.
Tsingy de Bemaraha NP, Madagascar. © Ken Behrens.

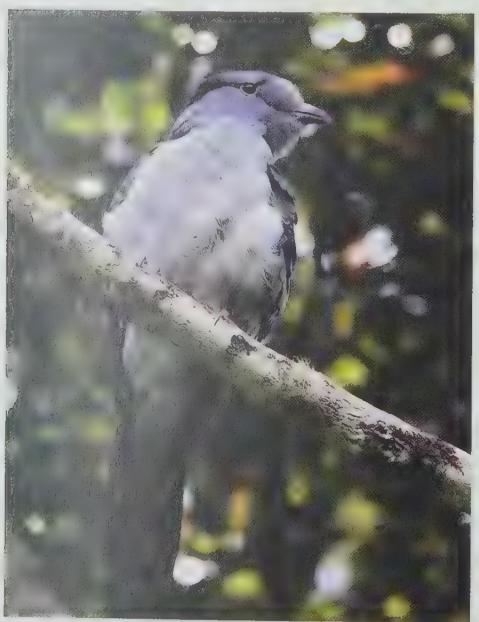




**Conservation** There are no immediate conservation concerns for the Cuckoo-roller, a benefit, apparently, of its flexibility in adopting disturbed habitats.

**Relationships** Leptosomidae is a highly distinct avian lineage long thought to be closely related to the rollers and ground-rollers in Coraciiformes (Cracraft 1981, Sibley & Ahlquist 1990, Livezey & Zusi 2007). Recent morphological analyses (Mayr 2008) confirm its distinctness, and molecular studies place Leptosomidae outside Coraciiformes in the large higher-landbird clade (Ericson *et al.* 2006a), possibly as sister-lineage to the clade comprising Trogoniformes plus Coraciiformes, Piciformes, and Bucerotiformes (Hackett *et al.* 2008, Jarvis *et al.* 2014).

Though it has the long tail of a cuckoo and large head and hooked bill of a roller, the Cuckoo-roller does not share close evolutionary origins with either of its namesake birds. Males and females of this monotypic family are strikingly dimorphic in appearance, with males resembling large cuckoo-shrikes (light gray and black) except in having greenish iridescence in the wings. By contrast, females are light brown with profuse barring and spots in shades of black and dark gray. Their loud whistled screams can be heard from afar, and they are not infrequently seen throughout much of their range. However, the relative paucity of information about this species' breeding biology leaves many interesting discoveries to be made.



Cuckoo-roller, *Leptosomus discolor*. Andasibe-Mantadia (Perinet) NP, Madagascar. © Adam Riley / Rockjumper Birding Tours.



Cuckoo-roller, *Leptosomus discolor*.
Anjozorobe-Angavo Protected Area, Madagascar. © Ken Behrens.

*LEPTOSOMUS*
1 species



*L. discolor*
Cuckoo-roller

# Order: TROGONIFORMES

## TROGONIDAE
Trogons

8 genera • 43 species

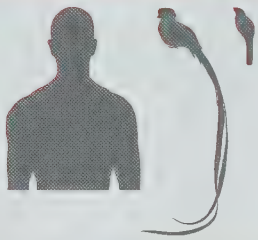
**Related Families** All families in Coraciiformes, Piciformes, and Bucerotiformes

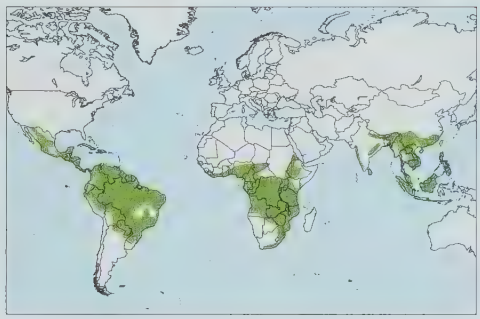
**Similar Birds** Patterned broadbills (Eurylaimidae), motmots (Momotidae)

**Description**
- Plumage soft, often iridescent blue or green above, matte red or yellow below; patterns slightly more diverse in Old World species, with orange in many species
- Wings short, rounded; tail long, truncate or graduated, often with distinctive black-and-white pattern beneath
- Body medium-sized; shape elongate; posture dominated by hunched shoulders, typically with upright carriage
- Bill short, broad, often serrate, usually with rictal bristles
- Head medium-sized, with unfeathered orbital ring and (in a few species) facial skin; neck short
- Legs and feet small, thin; toes with unique heterodactyl arrangement
- Males more colorful than females



Sumatran Trogon, *Apalharpactes mackloti*. Tapan Road, Sumatra, Indonesia. © Con Foley.





These generalist foragers of tropical forests often reveal their presence only by their deep whistled or chuckled calls. Once spotted, trogons can be distinguished by their hunched shoulders and long tails, and their underparts of bright yellow, red, or orange and upperparts of iridescent dark green or blue or matte cinnamon make a feast for the eyes. Sexual dimorphism in trogons grows most extreme in the quetzals, in which even the males, with their spectacularly long tail coverts, take an active role in incubating and feeding chicks in their tree-hole nest. Males sometimes aggregate loosely for days at a time early in the breeding season, but why they do so remains unclear.

**Habitat** Trogons inhabit a wide variety of forest types, spanning a rainfall continuum from relatively dry pine-oak forests to humid tropical rainforest. Trogons often sit midway up trees, often well below the canopy level, in areas that afford numerous perches from which they sally while foraging.

**Food** Trogons eat fruits, small vertebrates, and invertebrates. Studies of Neotropical trogons have shown their diet to consist mainly of fruit and insects, with some of the larger species taking vertebrate prey up to the size of small frogs and lizards. Studies of Asian trogons reveal diets that are similar to those of New World species. African trogons, however, are thought to be exclusively insectivorous, and quetzals feed almost entirely on fruit for most of the year.

**Breeding** Trogons are monogamous with biparental care. All are cavity-nesting birds, usually nesting in a hole made by other species or excavating their own hole in the pithy mass of a termite nest or a rotten trunk. Trogons lay 2 to 4 eggs, from which altricial chicks hatch after an incubation period of 15 to 19 days. Males and females share in parental care, from incubation on. Brooded attentively by the parents for the first week or so, the chicks develop for 16 to 30 days before they fledge and leave the nest.

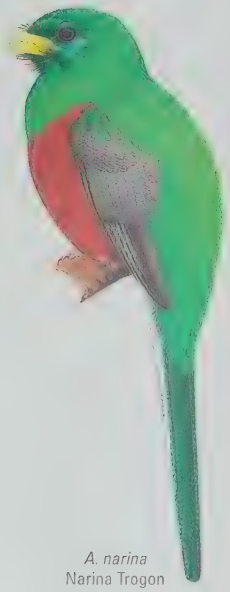
**Conservation** Although no trogon species faces extreme threats now, all are affected by continued tropical deforestation. Those of most concern are 11 species (26%) whose small ranges make them particularly vulnerable (10 NT, 1 VU).

**Relationships** Trogonidae is the only family in the order Trogoniformes, as this is an ancient lineage with uncertain affinities to other orders. Morphological analyses generally have placed trogons in a group that includes Coraciiformes, Piciformes, and Coliiformes (Cracraft 1981, Livezey & Zusi 2001, Livezey & Zusi 2007). Recent genetic work has not refined or revised these affinities much, though it suggests less affinity with Coliiformes and places trogons sister to a clade that consists of what we here call Bucerotiformes, Piciformes, and Coraciiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008, McCormack *et al.* 2013, Jarvis *et al.* 2014). The relationships within Trogonidae are generally aligned geographically. The quetzals (*Pharomachrus* and *Euptilotis*) of Central and South America are sister to the remaining trogons. Within these, the two endemic Caribbean taxa, Cuban Trogon *Priotelus temnurus* and Hispaniolan Trogon *Temnotrogon roseigaster*, are sister species, which together are sister to the remaining trogons. The African trogons (*Apaloderma*) are sister to the Asian trogons (*Harpactes* and *Apalharpactes*), which are in turn sister to the remaining Neotropical *Trogon* species (Moyle 2004).



Violaceous Trogon, *Trogon violaceus*. Finca Chavez, Heredia, Costa Rica. © Alex Vargas.

*Apaloderma*
3 species



*A. narina*
Narina Trogon

*Harpactes*
10 species



*H. ardens*
Philippine Trogon

*Apalharpactes*
2 species



*A. reinwardtii*
Javan Trogon

*Pharomachrus*
5 species



*P. mocinno*
Resplendent Quetzal

*Euptilotis*
1 species



*E. neoxenus*
Eared Quetzal

*Trogon*
20 species



*T. viridis*
Green-backed Trogon

*Temnotrogon*
1 species



*T. roseigaster*
Hispaniolan Trogon

*Priotelus*
1 species



*P. temnurus*
Cuban Trogon

# Order: Bucerotiformes

## Families: Bucerotidae, Upupidae, Phoeniculidae

Bucerotiformes is a small but diverse order, including hornbills (Bucerotidae), hoopoes (Upupidae), and woodhoopoes (Phoeniculidae), that had traditionally been allied with other families in Coraciiformes (Cracraft 1981, Livezey & Zusi 2001) based on morphological similarities, most importantly the shared possession of syndactyl feet. Still, the aforementioned three families have seemed less closely aligned than are others, prompting a treatment by some as a separate order, Upupiformes (AOU 1998), or as two orders, Upupiformes and Bucerotiformes (Sibley & Ahlquist 1990, Mayr 2000, Mayr 2011). We have chosen to place these three families all in one order, following Cracraft (2013) and Gill and Donsker (2014) in giving preference to Bucerotiformes as the group's name. Recent studies using DNA sequence data have confirmed the distinctness of Bucerotiformes from the other coraciiforms (Ericson *et al.* 2006a), and it is becoming clear that the clade consisting of the traditional Coraciiformes minus Bucerotiformes and Leptosomiformes is actually sister to Piciformes, and that Bucerotiformes is sister to these two clades taken together (Hackett *et al.* 2008, Jarvis *et al.* 2014).

Within Bucerotiformes, Upupidae is sister to Phoeniculidae (Sibley & Ahlquist 1990, Livezey & Zusi 2001, Ericson *et al.* 2006a), and Bucerotidae is in turn sister to these two families taken together (Hackett *et al.* 2008, Jarvis *et al.* 2014).



Southern Yellow-billed Hornbill, *Tockus leucomelas*. Kruger NP, South Africa. © Con Foley.

Bucerotiformes

## BUCEROTIDAE
Hornbills

16 genera • 62 species

Related Families Upupidae (hoopoes), Phoeniculidae (woodhoopoes)

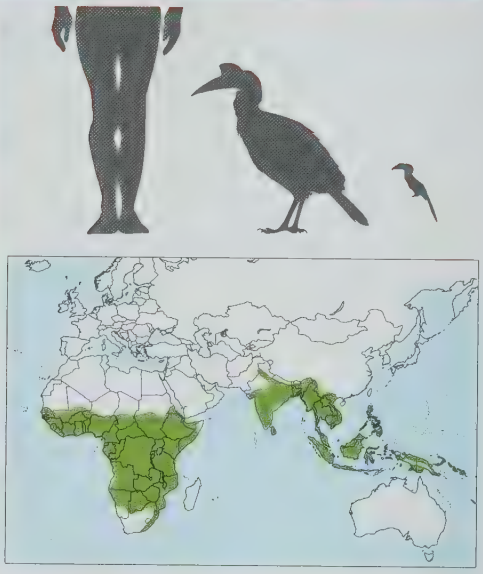
Similar Birds Toucans (Ramphastidae)

Description
- Plumage dominated by brown, black, gray, or white
- Wings long, broad, rounded; tail long, square-tipped
- Body ovoid, small to large
- Bill long, deep, decurved, sometimes sculpted and with pneumatized casque
- Head with bare skin around eye and throat (often brightly colored); "eyelashes" formed by barbless plumes; neck medium length, thick
- Legs short, feet thick, syndactyl
- Sexes generally similar, though sometimes with differences in eye color

Habitat Hornbills occupy a wide variety of habitats, from open savanna and woodland to tropical rainforest, though most prefer more densely wooded habitats.



Oriental Pied Hornbill, *Anthracoceros albirostris*. Pulau Ubin, Singapore. © Con Foley.



Food Bucerotids are omnivorous, feeding on a wide variety of invertebrates, vertebrates, fruits, and seeds. Species from savanna and dry woodlands, where fruit is relatively scarce, tend to be more carnivorous. Many of the large species that occupy Asian rainforests have a diet of up to 95% fruit of many plant species, but figs very often predominate.

Breeding Hornbills are generally monogamous with biparental care, though a few species retain male offspring from previous breeding episodes as helpers. Hornbills nest in natural cavities, or cavities already excavated by woodpeckers or barbets. With the exception of the ground hornbills, females seal themselves inside the nest cavity and remain there incubating the eggs until the young are hatched—often not leaving for months. The male (sometimes with helpers) is responsible for supplying food for her and later their nestlings through a small slit in the mud wall of the opening. Hornbills generally lay 1 to 8 eggs (with larger clutches in the smaller species), and the female usually initiates a rapid molt of all her feathers once the first eggs are laid. The chicks are in the nest for 40 to 50 days in the smaller species and about twice that in the larger hornbills. In some species, females and chicks emerge from the nest before the chicks are ready to fly, and the chicks finish their development in the company of their mother.

Resembling toucans in general appearance, hornbills have diversified much more in the relative size and elaboration of the bill. Hornbills occupy a broad variety of habitats in the Old World, from the dry savannas and scrub woodlands of Africa to the humid rainforests of Asia. Unique in their nesting habits, females of almost all species seal themselves into the nest cavity to incubate and brood the chicks, emerging later to finish rearing the chicks or at fledging with a new coat of feathers and new offspring in tow. These females rely on the males more than in any other species, so it is perhaps not surprising that extra-pair mating in hornbills is rare or non-existent.

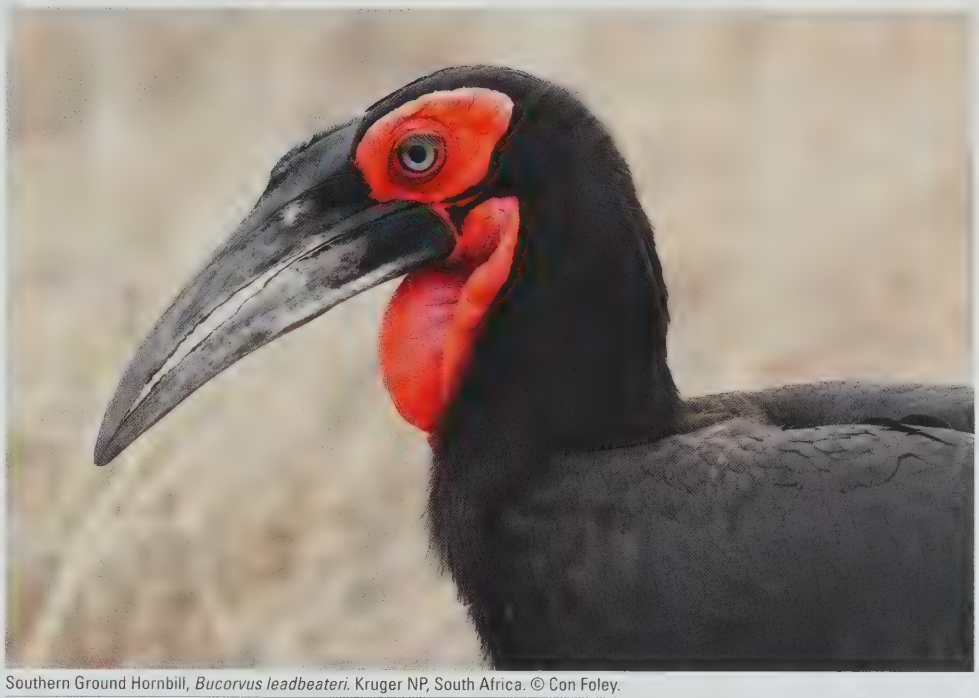


Indian Gray Hornbill, *Ocyceros birostris*. Mysore, Karnataka, India. © Varun HB.

cies, mother and young emerge together; in others, the female emerges after the chicks are fairly well developed. In the latter case, nestlings seal themselves back in and continue to be fed by their parents. The young hatch and fledge asynchronously, and remaining chicks continue to seal up the cavity as their older nestmates fledge. The female and chicks try to keep the nest clean by defecating through the small nest opening, but by the time the chicks fledge the nest is thoroughly soiled by feces and dander from developing feathers, as well as molted feathers from the female.

**Conservation** Few families of birds have such pervasive conservation concerns as Bucerotidae. Habitat destruction has put 26 species (42%) at risk, most of which are inhabitants of Asian forests, where timber cutting and local hunting for food and ivory continue to put extreme pressure on many hornbill populations (10 NT, 11 VU, 3 EN, 2 CR).

**Relationships** Bucerotidae has traditionally been placed in Coraciiformes, but Cracraft (1981) recognized that the hornbills are morphologically distinct and somewhat divergent from the remaining families in this order. In their phylogeny based on morphological characters, Livezey and Zusi (2007) found that Bucerotidae falls within Coraciiformes as the sister to Upupidae and Phoeniculidae, an affinity that has also been strongly supported by several recent molecular phylogenetic studies (Ericson *et al.* 2006a, Hackett *et al.* 2008). However, to include these three families with the other groups traditionally in Coraciiformes would require including the monophyletic Piciformes, and we have opted to reduce the size of Coraciiformes by separating Bucerotiformes from it. The ground hornbills (*Bucorvus*), which are sometimes treated as their own family (Bucorvidae), are sister to the rest of the hornbills (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Southern Ground Hornbill, *Bucorvus leadbeateri*. Kruger NP, South Africa. © Con Foley.




CERATOGYMNA
2 species
C. elata
Yellow-casqued Hornbill
BYCANISTES
7 species
B. cylindricus
Brown-cheeked Hornbill
RHINOPLAX
1 species
R. vigil
Helmeted Hornbill
BUCEROS
4 species
B. bicornis
Great Hornbill
ANORRHINUS
3 species
A. austeni
Austen's Brown Hornbill
OCYCEROS
3 species
O. griseus
Malabar Gray Hornbill
ANTHRACOCEROS
5 species
A. albirostris
Oriental Pied Hornbill
ACEROS
1 species
A. nipalensis
Rufous-necked Hornbill
RHABDOTORRHINUS
4 species
R. corrugatus
Wrinkled Hornbill
PENELOPIDES
4 species
P. panini
Visayan Hornbill
RHYTICEROS
6 species
R. undulatus
Wreathed Hornbill

Bucerotiformes

# UPUPIDAE
## Hoopoes

1 genus • 2 species

**Related Families** Phoeniculidae (woodhoopoes), Bucerotidae (hornbills)

**Similar Birds** Jays (Corvidae)

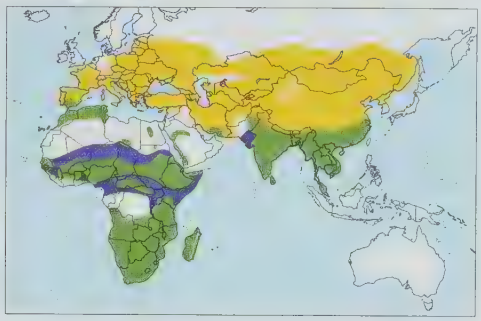
**Description**
- Plumage striking, with orange head, back and neck, boldly patterned black-and-white wings, and bright orange, black-tipped crest
- Wings long, broad, rounded; tail square
- Body medium-small, tapered ovoid in shape
- Bill long, slender, decurved
- Head small; neck thick and medium-long
- Legs short; feet small
- Sexes similar

**Habitat** Hoopoes live in open habitats that have short grass for foraging and are relatively close to sites with suitable cavities for nesting. Local population densities appear to depend on the availability of nest sites.



Common Hoopoe, *Upupa epops*.
Suwalszczyzna, Poland. © Paweł Wacławik.





**Food** Hoopoes prefer large insects (mole crickets, moth and butterfly larvae), most of which are extracted from pliable ground, but a large variety of other prey, including even plant material, are taken.

**Breeding** Hoopoes are monogamous with biparental care. They nest in cavities ranging from crevices in rocks; burrows in a bank, termite nest, or clump of epiphytes; tree cavities; or holes in man-made structures (including nest boxes). Very little if any nest material is added to the cavity. Clutch size ranges between 4 and 12 eggs, with 7 eggs about average in Europe and smaller clutches closer to the equator. The female incubates the eggs, being fed by the male through an incubation period that lasts 15 to 18 days. The downy chicks hatch asynchronously, and they remain in the nest until fledging at 25 to 30 days post-hatch. Chicks from an early age are capable, like the female, of hissing like a snake and squirting liquid feces and the foul-smelling contents of their uropygial glands at any intruders to the nest. During the first half of their nestling period, the chicks are still brooded by the female and the whole family is fed by the male. From then on, both males and females provision the chicks.

**Conservation** Hoopoes face no immediate conservation concerns, although populations respond rapidly to changes in agricultural practice and extent. An extinct hoopoe (*Upupa antaios*) was comparatively large and likely flightless. Known only from subfossils found on St. Helena Island in the Atlantic, it probably became extinct soon after human colonization in 1502.

**Relationships** Upupidae has long been associated with Phoeniculidae and Bucerotidae, formerly in Coraciiformes, but now in the separate order Bucerotiformes. This hypothesis is now broadly supported by morphological and DNA sequence data (Sibley & Ahlquist 1990, Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2011, Jarvis *et al.* 2014), and both DNA sequence data (Ericson *et al.* 2006a, Hackett *et al.* 2008) and shared skeletal features of the wing and bill (Cracraft 1981, Mayr 2000) indicate that Upupidae and Phoeniculidae are sister taxa.

Hoopoes are named for their dove-like song, which the males deliver from a perch with downflexed head and inflated throat, giving the call a ringing and far-ranging quality. But song is not what most observers think of when seeing their first Hoopoes. Their crazy looks suggest they are fashion pioneers of the bird world: Both sexes are outrageously attired with long, lax orange crests tipped with black and often held erect like a giant fan. These are complemented by a long, thin, decurved bill and dramatic barring on wings and tail. Hoopoes build their nests in all kinds of cavities, even in towns, and they are legendarily foul-smelling, the product of powerful uropygial gland secretions used in nest defense.



Common Hoopoe, *Upupa epops*. Kack, Poland. © Michal Jonczyk.

*UPUPA*
2 species



*U. marginata*
Madagascar Hoopoe

Bucerotiformes

# PHOENICULIDAE
## Woodhoopoes

2 genera • 8 species

**Related Families** Upupidae (hoopoes), Bucerotidae (hornbills)

**Similar Birds** Large honeyeaters (Meliphagidae), bee-eaters (Meropidae)

**Description**
- Plumage iridescent black or green
- Wings medium length, rounded; tail long, graduated, and stiff; both often with contrasting white pattern
- Body small to medium, elongate ovoid
- Bill long, slender, and laterally compressed, strongly decurved in some species
- Head slightly elongate; neck thick
- Legs short; toes long with long, sharply curved claws
- Sexes generally similar; males larger than females

**Habitat** Forest, savanna, or scrubland. Woodhoopoes are arboreal and require trees for both feeding and nesting.

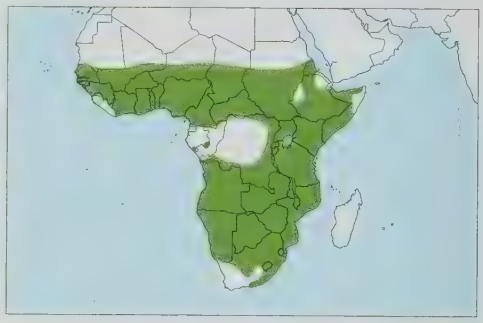
**Food** Woodhoopoes feed almost exclusively on insects and other arthropods, which they extract from crevices in bark with their forceps-like bills, often hitching up the trunk like woodpeckers, supported by their long, stiff tails. Some species occasionally forage on the ground or sally for flying insects.

**Breeding** Phoeniculids are monogamous with biparental care. All or most *Phoeniculus* species breed cooperatively by retaining young of both sexes, up to ten at times, from previous breeding attempts, who assist the core reproductive pair in their parental duties. Wood-hoopoes are secondary tree cavity nesters, and the shortage of tree holes can lead to nests on idle machinery or even on the ground. Clutch size ranges from 2 to 5, and the eggs are blue to gray or green, sometimes with brown splotches, and with scattered chalky pits on the surface. Only the breeding female incubates the eggs, for a period of 17 to 18 days, but she is fed by the breeding male and any helpers present. Chicks are born with long white down, and they fledge and leave the nest at about a month of age post-hatch, though they continue to increase in weight for some time after fledging. During the first half of the chicks' development, all food that is brought to the nest is passed first to the female and is then fed to the chicks. Gradually, the female begins to



Green Woodhoopoe, *Phoeniculus purpureus*. Kruger NP, South Africa. © John McKean.





Woodhoopoes are dark, sleek, and glossy residents of savanna and forests of sub-Saharan Africa. Most species of savanna country form noisy social groups of up to a dozen birds that breed cooperatively, and in these species, each sex has a distinctive repertoire of calls; coordinated calling at group "rallies" appears to reinforce group cohesion. Woodhoopoes are well-suited to dining in the trees. Their short legs keep their bodies close to the trunk, and they lean against their stiff tails to move, woodpecker-like, up trunks, probing for bark-dwelling invertebrates with their long, slender, and often decurved bills. Like their cousin the Hoopoe, some woodhoopoes excrete foul-smelling compounds that appear to help keep both ectoparasites and predators at bay.



Green Woodhoopoe, *Phoeniculus purpureus*. Kruger NP, South Africa. © Dubi Shapiro.

forage and provision the growing young, while the male and helpers begin to feed the chicks directly without a maternal go-between.

**Conservation** There are no immediate conservation concerns for any of the woodhoopoes.

**Relationships** Phoeniculidae is the sister group to Upupidae, and this clade together is sister to Bucerotidae (Sibley & Ahlquist 1990, Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2011). The close relationship of the hoopoes and woodhoopoes is supported by skeletal features of the wing and bill (Cracraft 1981, Mayr 2000) in addition to recent genetic analyses (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Green Woodhoopoe, *Phoeniculus purpureus*. Kruger NP, South Africa. © Hugh Chittenden.



Green Woodhoopoe, *Phoeniculus purpureus*. Waza NP, Cameroon. © Christian Artuso.

*PHOENICULUS*
4 species



*P. bollei*
White-headed Woodhoopoe

*RHINOPOMASTUS*
4 species



*R. cyanomelas*
Common Scimitarbill

# Order: CORACIIFORMES

## Families: Meropidae, Coraciidae, Brachypteraciidae, Todidae, Momotidae, Alcedinidae

Traditionally, Coraciiformes included the rollers, ground-rollers, Cuckoo-roller, bee-eaters, todies, kingfishers, motmots, hornbills, hoopoes, and woodhoopoes (Cracraft 1981). Although some morphological characters, most notably syndactyl toes, united this large group of families, many workers speculated that these families did not form a natural group (e.g., Mayr 2008, Mayr 2011), and some authors placed the hoopoes, woodhoopoes, and hornbills in their own order, Bucerotiformes or Upupiformes (AOU 1998, Gill *et al.* 2009).

Recent genetic work on relationships with Piciformes has added impetus to this splitting up of the traditional Coraciiformes, for it is becoming increasingly clear that Piciformes is actually embedded within the traditional, larger Coraciiformes, and it is sister to the coraciiform families Meropidae, Coraciidae, Brachypteraciidae, Todidae, Momotidae, and Alcedinidae. These families are here included in a smaller Coraciiformes, which, together with the Piciformes, forms a clade that is in turn sister to the remaining former Coraciiformes (Upupidae, Phoeniculidae, Bucerotidae), which we here call Bucerotiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008, Jarvis *et al.* 2014).

This leaves one taxon from the original Coraciiformes unaccounted for, and that is the Cuckoo-roller *Leptosomus discolor*. Although it was previously allied with the rollers and ground-rollers on the basis of morphological characters (Cracraft 1971, 1981, Livezey & Zusi 2007), several recent genetic and morphological studies found it to be more distantly related to Coraciiformes, and instead sister to a group that includes Trogoniformes, Bucerotiformes, Piciformes, and Coraciiformes (Hackett *et al.* 2008, Mayr 2008, Mayr 2011, Jarvis *et al.* 2014).



Red-bearded Bee-eater, *Nyctyornis amictus*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

Coraciiformes

# MEROPIDAE
## Bee-eaters

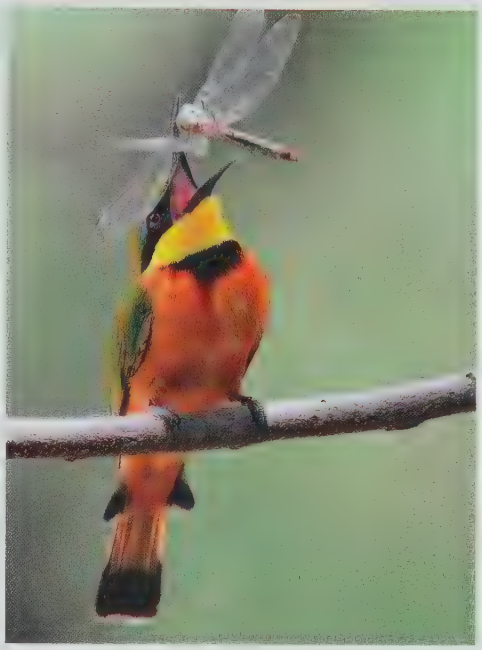
3 genera • 31 species

**Related Families** Coraciidae (rollers), Brachypteraciidae (ground-rollers), Alcedinidae (kingfishers), Momotidae (motmots), Todidae (todies)

**Similar Birds** Jacamars (Galbulidae), motmots (Momotidae)

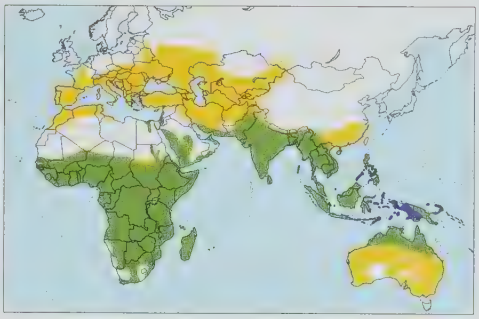
**Description**
- Plumage colorful; greens, blues, and yellows most common below, darker above
- Wings long, pointed; tail long, with elongate pair of central or lateral rectrices in many species
- Body small to very small, elongate ovoid in shape
- Bill long, slender, laterally compressed, slightly decurved, and sharply pointed
- Head medium, slightly elongate; neck thick, short
- Legs short; feet small with syndactyl toes
- Sexes usually similar

**Habitat** Bee-eaters live in open habitats, usually savanna and forest and woodland edges and clearings; only a few species live in closed-canopy forest.



Little Bee-eater, *Merops pusillus*. Lake Eyasi, Tanzania. © Piotr Jonczyk.





**Food** Bee-eaters specialize on large flying insects, perching on exposed branches and sallying out into open air to chase them as they pass. Only the Blue-headed Bee-eater *Merops muelleri* forages from low near the ground on insects flying through gaps in understory vegetation. Whereas many species hunt primarily bees and related insects, other bee-eaters take a wider range of flying insects, but they seem most often to have affinity for prey that have defenses against predation by other insectivores.

**Breeding** Bee-eaters have highly variable breeding and social systems, ranging from solitary pairs to large colonies with complex family interactions, including cooperative breeding. Bee-eaters nest in tunnels, typically located in vertical earth banks or in the ground, that they excavate themselves. Females lay 2 to 7 eggs. Both sexes engage in nest construction, incubation, and chick provisioning. Bee-eater young hatch naked and helpless after about 20 days of incubation, and they grow to fledging age after about a month in the nest; they are fed by the parents or helpers for a few days after fledging. In the well-studied White-fronted Bee-eater *M. bullockoides*, helpers (usually birds from the breeding pair's previous broods) increase the number of young fledged by increasing the amount of food brought to chicks, and parents in need of help at home have been known to sabotage the efforts of independently breeding

Bejeweled in brilliant colors, with central tail streamers or forked tails in many, bee-eaters are perhaps the most graceful aerial insectivores of the Eastern Hemisphere. These are sit-and-wait predators on large flying insects, aptly named given their predilection for wasps and bees, whose stings they extract before ingesting their prey. Bee-eaters prefer savannas and forests where isolated tree perches provide good focal points for their sallying flights, expanding into more open country only where man-made structures (or large animals) provide reliable perches. Many species are colonial cooperative breeders with some of the most complex social lives among birds. They nest in burrows, and the arduous excavation sometimes involves not only the pair but also other helpers.



Northern Carmine Bee-eater, *Merops nubicus*. Bilen Lodge, Afar, Ethiopia. © Ian Davies.

offspring to recruit them as helpers at the home burrow.

**Conservation** Only one of 31 species of bee-eaters (3%) faces any immediate conservation threats (1 NT); that species, the Blue-moustached Bee-eater *M. mentalis*, appears to be undergoing rapid declines in population size associated with the logging of its forest habitat.

**Relationships** Within Coraciiformes, bee-eaters appear to be most closely allied with the motmot/kingfisher/tody and roller/ground-roller groups, although recent studies disagree about the relationships of these three groups with respect to one another (Cracraft 1981, Ericson *et al.* 2006a, Livezey & Zusi 2007). The most recent interpretation is that Meropidae is sister to all the other Coraciiformes as treated here (Hackett *et al.* 2008). Within Meropidae, there are several well-supported clades (Marks *et al.* 2007), including one containing mostly sedentary African species, and one spread across the Old World that includes many migratory species. The forest-dwelling *Nyctyornis* species appear to be sister to the rest of the family.



Red-throated Bee-eater, *Merops bulocki*. Murchison Falls NP, Uganda. © Piotr Jonczyk.

*NYCTYORNIS*
2 species

*N. athertoni*
Blue-bearded Bee-eater

*MEROPOGON*
1 species

*M. forsteni*
Purple-bearded Bee-eater

*MEROPS*
28 species

*M. muelleri*
Blue-headed Bee-eater

Coraciiformes

# CORACIIDAE
## Rollers

2 genera · 13 species

**Related Families** Brachypteraciidae (ground-rollers)

**Similar Birds** Kingfishers (Alcedinidae), bee-eaters (Meropidae)

**Description**
- Plumage variable, but generally colorful with blue and purple accenting or melding with brown
- Wings long, broad, with striking dark bands; tail medium length, often with very long outer rectrices
- Body small to medium, cylindrical ovoid in shape
- Bill medium length, wide, and deep, with slight terminal hook
- Head large; neck short, thick
- Legs short; syndactyl toes short and thin
- Sexes generally similar

**Habitat** Most rollers live in open habitats, often with some trees, including woodland, savanna, and even the edges of dense tropical forest.

**Food** Rollers are carnivorous, feeding on animals ranging from small insects to small vertebrates. *Coracias* species are sit-and-wait predators that generally pounce on prey on the ground. *Eurystomus* species are more frequently aerial insectivores, sallying from a perch after flying insect prey.

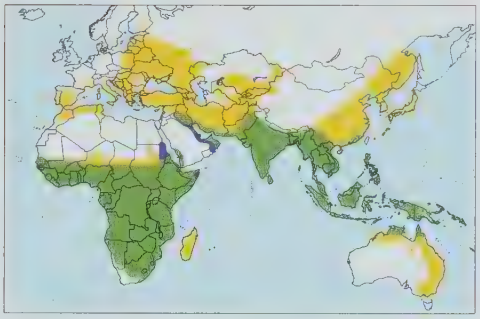
**Breeding** Coraciids are monogamous with biparental care. Most species do not construct their own nests, but instead use natural tree cavities, rock crevices, or holes previously excavated by other birds. The nest cavity is lined at most with a thin pad of vegetation, but is more often bare. Females lay 2 to 4 eggs in the tropics, and up to 6 in the temperate zone. Only the female incubates at night, but otherwise both sexes take near-equal roles in parental care. After 17 to 24 days of incubation, the chicks hatch naked, asynchronously, but by fledging, 25 to 30 days later, all the nestlings can leave the nest within a day or two of each other. They are fed for at least a few days more, though this, like all other details of their breeding biology, is not well known.

**Conservation** Two coraciid species (15%) have conservation concerns (2 NT). The European Roller *Coracias garrulus*, widespread in Europe and the Middle East, is declining rapidly, apparently as traditional pasture is being replaced by intensive agriculture; the Azure Dollarbird



Broad-billed Roller, *Eurystomus glaucurus*. Ankarafantsika NP, Madagascar. © Dubi Shapiro.

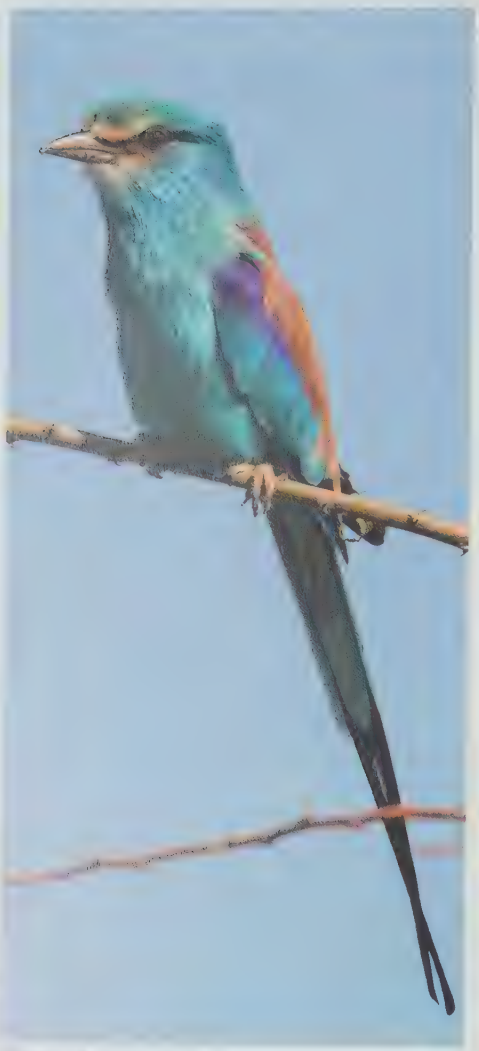




Stocky birds with large heads, broad shoulders, and stout bills, rollers are united by their method of sit-and-wait predation on large insects, other invertebrates, or even reptiles and rodents. Rollers are named for their acrobatic display flights, in which they dive rapidly toward the ground with wings and body rolling back and forth. Many are a distinctive light blue color overall with darker patches of intense pure blue, though many have a good deal of brown in their plumage. Dollarbirds, named for the shiny white coin-sized patch on each wing, are stockier and darker in color than the other rollers. All are hole-nesters, with white, nearly spherical eggs much like those of many other coraciiform birds.



European Roller, *Coracias garrulus*. Pusztaszer, Hungary. © Reinder Doeleman.



Abyssinian Roller, *Coracias abyssinicus*.
Bale Plain, Mega, Oromia, Ethiopia. © Ian Davies.



Indian Roller, *Coracias benghalensis*. Hessarghata, Bengaluru, Karnataka, India. © Varun HB.

*Eurystomus azureus*, an endemic to the island of Sulawesi, has declined rapidly with the logging of that island's forests.

**Relationships** Recent morphological and genetic evidence supports a sister relationship between Coraciidae and Brachypteraciidae (Cracraft 1971, 1981, Kirchman *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2011). The clade formed of these two families is in turn closely related to the group comprising Alcedinidae, Todidae, and Momotidae (Kirchman *et al.* 2001, Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008).

*CORACIAS*
9 species



*C. caudatus*
Lilac-breasted Roller

*EURYSTOMUS*
4 species



*E. orientalis*
Oriental Dollarbird

Coraciiformes

# BRACHYPTERACIIDAE
## Ground-rollers

4 genera • 5 species

**Related Families** Coraciidae (rollers)

**Similar Birds** Laughing-thrushes (Leiothrichidae), puffbirds (Bucconidae), thrushes (Turdidae), thrashers (Mimidae)

**Description**
- Plumage boldly marked and idiosyncratically patterned in most species
- Wings medium-long, broad; tail medium length and graduated in most, very long and pointed in *Uratelornis*
- Body small, cylindrical ovoid, stocky in all but *Uratelornis*
- Bill medium-short, thick
- Head medium-large to large; neck short, thick
- Legs medium to long; toes medium
- Sexes generally similar, female smaller with shorter tail in *Uratelornis*

**Habitat** Ground-rollers occupy two habitat types: *Uratelornis* is restricted to arid thorn-scrub in southwestern Madagascar, and the remaining four species are found in the island's eastern tropical and subtropical rainforests.

**Food** Most ground-rollers, as their name suggests, forage primarily in the leaf litter or soil, but *Brachypteracias* takes prey mostly from the trunks of trees and branches. Ground-rollers eat a variety of insects, crabs, snails, and small vertebrates (chameleons and geckos).

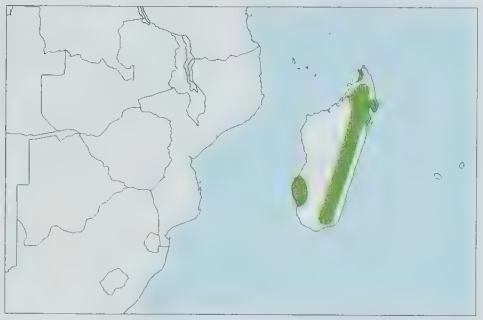
**Breeding** The ground-rollers are monogamous with biparental care. Most species dig terrestrial burrows for nesting; only *Brachypteracias* nests in tree cavities. *Uratelornis* digs a burrow in flat, sandy ground, whereas the remaining species use relatively vertical banks. Females typically lay 2 eggs, with 1 to 4 eggs known. Both male and female ground-rollers construct the nest, but incubation appears to be mostly, or entirely, by the female and to take from 20 to 26 days. Both male and female are vigilant and actively defend the nest, and both sexes are active in caring for the chicks, which fledge after 18 to 30 days in the nest.

**Conservation** Four ground-roller species (80%) have significant conservation concern (1 NT, 3 VU), all because of their small ranges, vanishing



Long-tailed Ground-roller, *Uratelornis chimaera*. Ifaty, Madagascar. © Dubi Shapiro.





These insectivores of Madagascar are generally large-headed, with a base color of olive or brown accented by distinctive patterns of blue or rufous. Curiously, they possess both powder-down and long aftershafts in their body feathers. Generally thrush- or thrasher-like in their movements, these are largely birds of the ground—as their name implies—and all but one species nest in excavated burrows. However, most ground-rollers climb to branches to deliver their distinctive hooting territorial calls, which they do with an emphatic nod of the head at every note. Given their restricted distribution and evolutionary distinctiveness, there are likely many more surprises to be uncovered about the species in this family, if we can do so before they disappear.



Scaly Ground-roller, *Geobiastes squamiger*. Andasibe-Mantadia (Perinet) NP, Madagascar. © Dubi Shapiro.

habitats, and perhaps predation by introduced rats; only the Pitta-like Ground-roller *Atelornis pittoides* is of low conservation concern.

**Relationships** The ground-rollers have long been considered to belong in Coraciiformes, and both morphological and more recent genetic evidence supports a sister relationship between Brachypteraciidae and Coraciidae (Cracraft 1971, Kirchman *et al.* 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008, Mayr 2008, 2011). This clade of two families is in turn most closely related to the clade made up of Alcedinidae, Todidae, and Momotidae (Kirchman *et al.* 2001, Livezey & Zusi 2001, Ericson *et al.* 2006a, Hackett *et al.* 2008).



Rufous-headed Ground-roller, *Aterlornis crossleyi*. Ranomafana NP, Madagascar. © Dubi Shapiro.

*BRACHYPTERACIAS*
1 species

*B. leptosomus*
Short-legged Ground-roller

*GEOBIASTES*
1 species

*G. squamiger*
Scaly Ground-roller

*URATELORNIS*
1 species

*U. chimaera*
Long-tailed Ground-roller

*ATELORNIS*
2 species

*A. pittoides*
Pitta-like Ground-roller

Coraciiformes

# TODIDAE
Todies

1 genus • 5 species

**Related Families** Momotidae (motmots), Alcedinidae (kingfishers)

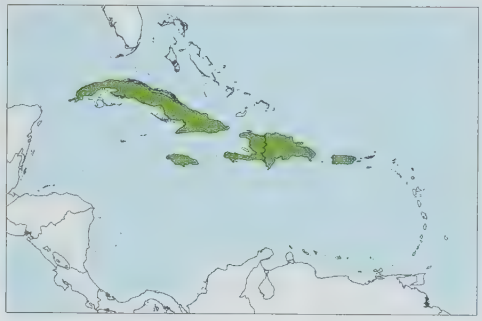
**Similar Birds** Tody motmot (Momotidae), small kingfishers (Alcedinidae), tody-flycatchers (Tyrannidae)

**Description**
- Plumage entirely green above, with red throat and white malar stripe; variably colorful below, ranging from white to yellow; most with pink flanks
- Wings short, rounded; tail medium length, narrow, and square
- Body very small, compact ovoid in shape
- Bill long, straight, dorso-ventrally flattened and bright red, with moderate rictal bristles
- Head large; neck short
- Legs short, slender; toes medium in length and girth
- Sexes generally similar



Cuban Tody, *Todus multicolor*.
Siboney Research Station, Santiago de Cuba, Cuba. © D. W. Winkler.





Todies are tiny, brilliant green insectivores with bright red, long, flat bills on heads seemingly too large for their bodies. They tend to sit silently and alert, often puffing and smoothing their plumage while their heads dart all about, constantly getting new views of the leaves, and potential prey, around them. When interacting over mates or territories, todies can become quite active and noisy. Todies are very often seen in pairs, and both sexes help raise the chicks in a burrow nest carved into an earthen bank. Today, todies occur only on the four largest Caribbean islands, but fossils from North America and Europe indicate that they once had a much wider distribution.

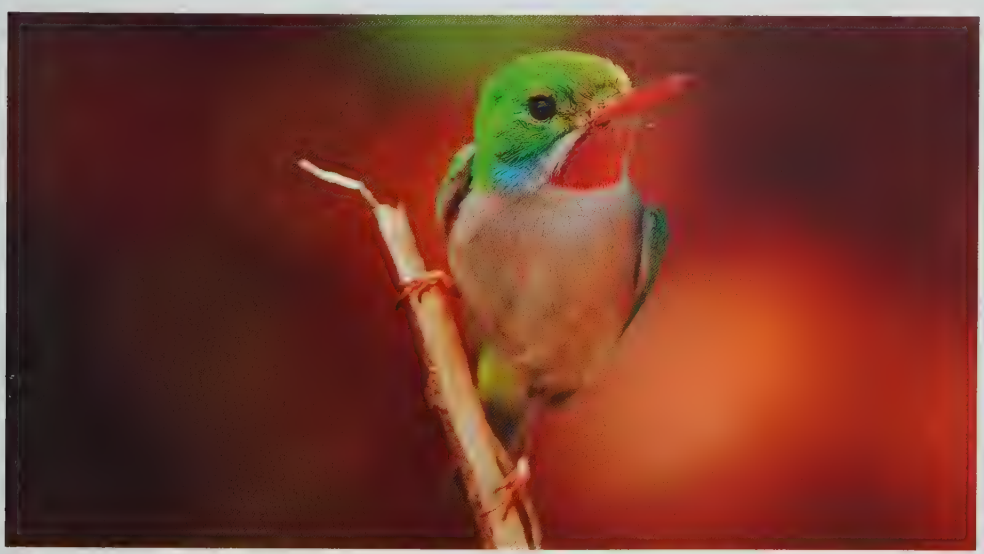
**Habitat** All five species of todies live in forested and woodland habitats with dense vegetative cover. The two species endemic to the island of Hispaniola occur at different elevations.

**Food** Todies are almost entirely insectivorous, feeding by sallying out from a perch after insects that are flying by or crawling on the undersides of overhanging leaves.

**Breeding** Todies are monogamous with biparental care. Males are especially territorial and display vigorously. During displays and chases, males and females make wing-rattling and wing-cracking noises and give distinctive chattering-rattling calls. Pairs of Puerto Rican Todies *Todus mexicanus* are often augmented by apparently unrelated helpers that assist with incubation and provisioning of young. Todies generally nest in burrows that they excavate in earthen banks, rarely in old woodpecker holes. Females lay 1 to 4 eggs that are very large for their size (single eggs are up to 25% of the female's mass). Both male and female engage in nest construction, incubation, and provisioning of chicks. After 21 to 22 days of incubation, the chicks hatch asynchronously and naked but develop down in the first week or so. The nestlings take about three weeks to fledge, and they are fed by their parents for another three weeks or so before they become independent and leave the parental territory.

**Conservation** No tody species are yet of pressing conservation concern, though the Narrow-billed Tody *T. angustirostris* is limited to declining higher-elevation forests on Hispaniola.

**Relationships** Within Coraciiformes, Todidae is sister to the clade consisting of Momotidae plus Alcedinidae (Ericson *et al.* 2006a, Hackett *et al.* 2008). It had earlier been suggested that Todidae and Momotidae were sister taxa that were together most closely allied to Alcedinidae and Meropidae (Cracraft 1981), but it now appears that Meropidae is more distantly related to these other three families and that Momotidae and Alcedinidae are sister taxa (Johansson *et al.* 2001, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008).



Cuban Tody, *Todus multicolor*. Siboney-Juticí Ecological Reserve, Santiago de Cuba, Cuba. © Anay Serrano-Rodríguez.

*TODUS*
5 species



*T. subulatus*
Broad-billed Tody

Coraciiformes

# MOMOTIDAE
## Motmots

6 genera · 14 species

**Related Families** Alcedinidae (kingfishers)

**Similar Birds** Bee-eaters (Meropidae), jacamars (Galbulidae), puffbirds (Bucconidae), trogons (Trogonidae)

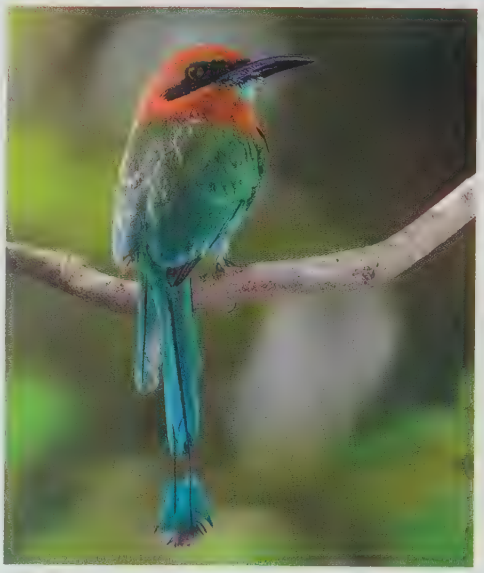
**Description**
- Plumage typically green or blue-green or rich brown, usually with dark spot in center of breast
- Wings short, rounded; tail long, graduated, often with racket-tip
- Body small to medium, ovoid, slightly elongate
- Bill medium length, moderately deep, slightly decurved, and serrate
- Head medium-sized; neck short, thick
- Legs short; feet medium-small
- Sexes similar

**Habitat** Motmots occur in most woodland and forested habitats in their range, and they require earthen banks for excavating nest cavities.

**Food** Most motmots feed primarily on large arthropods, usually captured when the bird sallies out from a stationary perch. Motmots occasionally feed on a variety of other foods, including small vertebrates, crabs, fish, and fruit.

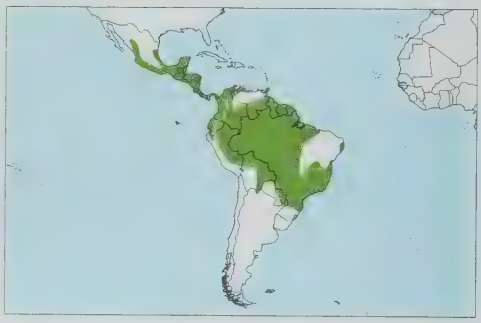
**Breeding** Motmots are monogamous, with at least some species having long-term pair bonds. Like most Coraciiformes, motmots dig their own nest burrows, usually in natural or manmade banks, and they make a new burrow every season, sometimes as long as 5 m into the ground. The entrance to the burrow is typically wider than it is high. Clutch size for motmots is generally 4 eggs. Both parents participate in all aspects of parental care, and they take very long incubation shifts, apparently shifting each other from the nest once or twice per 24-hour period throughout an incubation period that lasts 18 to 22 days. The naked young never develop down (except in *Aspatha*), but instead grow directly into adult-like feathers. The eyes do not open until about two weeks of age, but the chicks grow rapidly and leave the nest in a little over three weeks. Because their burrows are so deep and change-overs at the nest infrequent, very few of these species have been studied at all well.

**Conservation** Habitat loss is the main reason that one motmot species (7%) is at risk. The Keel-billed Motmot *Electron carinatum* has a limited Central American range with low population density, and a reliance on primary forest, which is rapidly disappearing (1 VU).

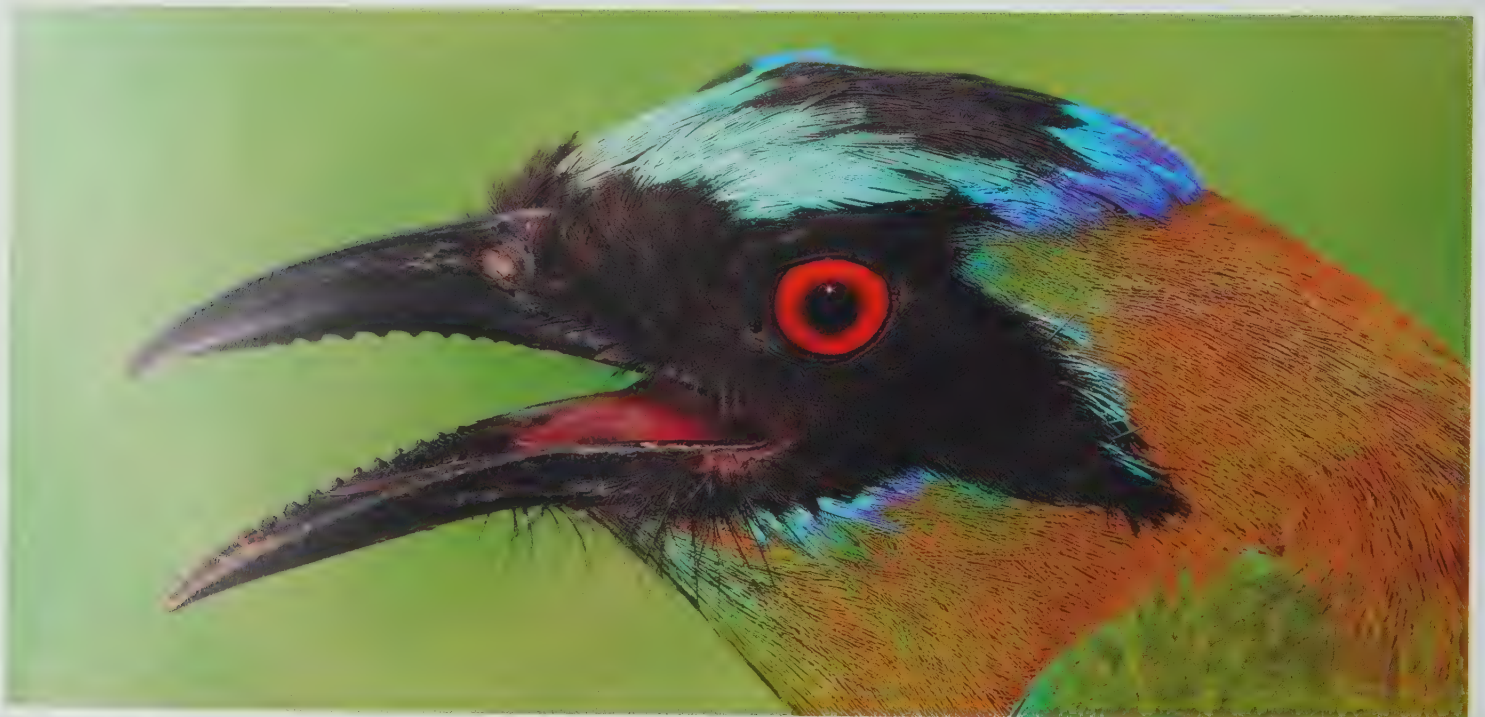


Broad-billed Motmot, *Electron platyrhynchum*. La Selva Biological Station, Costa Rica. © Alex Vargas.





Motmots are methodical predators of large insects and small vertebrates in Neotropical forests. Although typically colorful and often vocal, motmots can be surprisingly difficult to locate as they sit and wait for passing prey. Most sport two distinctively racket-shaped tail feathers, formed when weak barbs from the feather shafts fall off during preening or normal wear. Possibly to communicate that a predator has been detected, these birds often wag their distinctive tails back and forth in irregular rhythms, freezing their feathered pendulums in place at unpredictable intervals along the arc of rotation. Motmots are among the most assiduous nest-excavators and care-givers of all coraciiform nest-burrowers, but their nesting habits are remarkably little studied.



Whooping Motmot, *Momotus subrufescens*. Gamboa, Panama. © Mark A. Chappell.

**Relationships** Early morphological and molecular studies suggested that Momotidae is sister to Todidae, with these two together sister to Alcedinidae (Cracraft 1981, Johansson *et al.* 2001). However, further morphological study placed the motmots outside of a tody-kingfisher group (Livezey & Zusi 2007). Recent molecular studies consistently place Momotidae as sister to Alcedinidae, with these two together being sister to Todidae. This clade of three families appears most likely to be sister to the clade made up of Coraciidae plus Brachypteraciidae, with all five taken together sister to Meropidae (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Whooping Motmot, *Momotus subrufescens*. Macara, Ecuador. © Dubi Shapiro.

*HYLOMANES*
1 species

*H. momotula*
Tody Motmot

*ASPATHA*
1 species

*A. gularis*
Blue-throated Motmot

*MOMOTUS*
7 species

*M. bahamensis*
Trinidad Motmot

*BARYPHTHENGUS*
2 species

*B. martii*
Rufous Motmot

*ELECTRON*
2 species

*E. platyrhynchum*
Broad-billed Motmot

*EUMOMOTA*
1 species

*E. superciliosa*
Turquoise-browed Motmot

Coraciiformes

## ALCEDINIDAE
Kingfishers

19 genera · 120 species

Related Families Momotidae (motmots)

Similar Birds Puffbirds (Bucconidae), jacamars (Galbulidae), rollers (Coraciidae)

Description
- Plumage boldly patterned, often dominated or accented by blues, greens, or rich browns
- Wings medium to long, broad; tail usually short and square, but graduated with very long, racket-tipped central rectrices in *Tanysiptera*
- Body tiny to medium, compact ovoid
- Bill massive, straight, with a sharp point, usually black or bright red
- Head large; neck short and thick
- Legs short; feet small with short, usually syndactyl toes
- Sexes generally similar; some species dimorphic in plumage or size

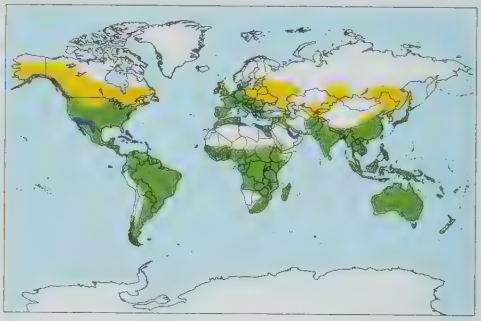
Habitat Many kingfishers live near water, but the terrestrial kingfishers of the Old World occupy a variety of woodland and forest habitats.

Food As with their habitats, kingfishers have a varied diet, although all are entirely carnivorous. Most kingfishers are sit-and-wait predators, either perching or hovering over water or the forest floor. Small terrestrial kingfishers feed primarily on large insects, whereas larger terrestrial kingfishers such as *Halcyon* and *Dacelo* eat lizards, amphibians, mammals, and birds. The many aquatic kingfishers feed primarily on fish, which they capture by plunging into the water. *Clytoceyx* uses its short, strong bill to push through soft dirt in search of earthworms and other subterranean prey.



Gray-Headed Kingfisher, *Halcyon leucocephala*. Masai Mara Reserve, Kenya. © Con Foley.





Breeding Most kingfishers are monogamous with biparental care. In diverse species across the family, cooperative breeding sometimes occurs, with either retained offspring or unrelated helpers. Serial polyandry has also been reported in some. All kingfishers are cavity- or burrow-nesters, though they use a variety of substrates. Many excavate their own burrows in earthen banks, using their semi-fused front toes to help shovel out dirt and sand. Others nest in tree cavities, utilizing old woodpecker cavities when available, or excavating their own nest hole in

Ranging in size from tiny dwarf and pygmy kingfishers to the crow-sized kookaburras, kingfishers occupy waterside or wooded habitats around the world. Although some eat no fish, all kingfishers are adept hunters on land or water, seizing prey in their large bills. Most nest in tree holes or in burrows in banks or termite nests. Burrow excavation begins by the pair taking turns diving right into the wall, beak-first, to dislodge the first body-length or so of earth. Aquatic species have an off-axis cam-shaped lens that allows them to switch instantly between focus points on their retinas as soon as their head is underwater capturing prey.



Banded Kingfisher, *Lacedo pulchella*. Kaeng Krachan NP, Thailand. © Alex Vargas.

soft or rotted wood or in arboreal termite nests. Kingfishers generally lay 2 to 10 eggs, with fewer eggs laid in tropical species. Both members of the pair involve themselves in all aspects of parental care, from nest construction on. The chicks hatch naked with eyes closed, and some use a hook on their bill tip to kill siblings if food deliveries from the parents are sparse. Incubation takes two weeks to a month (longer in larger species) and chicks are in the nest for three to six weeks. Most are fed for only a few days after leaving the nest, and they become independent fairly rapidly.

**Conservation** At least 42 kingfisher species (35%) are of conservation concern (25 NT, 10 VU, 2 EN, 4 CR, 1 EW). The Guam Kingfisher *Todiramphus cinnamominus* is considered extinct in the wild, but a captive breeding program appears to be producing enough offspring that a reintroduction to its limited island range would be feasible if the habitat could be restored and introduced brown tree snakes *Boiga irregularis* could be eradicated. Many of the other endangered kingfishers have very small island ranges, and they are all vulnerable to habitat alteration and introduced predators. Intensive logging has also led to widespread destruction of habitat for forest kingfishers in Southeast Asia.

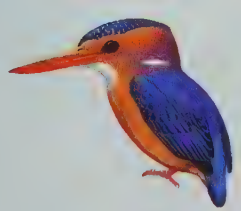
**Relationships** The most robust recent studies strongly support placing Alcedinidae as sister to Momotidae within Coraciiformes (Ericson *et al.* 2006a, Hackett *et al.* 2008). Despite some contrary morphological characters (Johansson *et al.* 2001, Livezey & Zusi 2007), it seems most likely that Todidae is sister to this clade of two (Ericson *et al.* 2006a, Hackett *et al.* 2008). There are three main groups within the Alcedinidae, each recognized as a subfamily (Moyle 2006). Alcedininae occurs throughout the Old World and includes many small to tiny jewel-colored species. Most species in the small subfamily Cerylinae specialize on diving for fish, and the subfamily contains all the kingfishers of the Western Hemisphere. The most speciose subfamily, Halcyoninae, includes the kookaburras and most of the other woodland-dwelling kingfishers, which have little or no association with watercourses.



Common Kingfisher, *Alcedo atthis*. Singapore Botanic Gardens, Singapore. © Con Foley

Subfamily **ALCEDININAE**

*ISPIDINA*
2 species



*I. picta*
African Pygmy-kingfisher

*CORYTHORNIS*
6 species



*C. cristatus*
Malachite Kingfisher

*CEYX*
24 species



*C. erithaca*
Oriental Dwarf-kingfisher

*ALCEDO*
8 species



*A. atthis*
Common Kingfisher

## Subfamily CERYLINAE

*MEGACERYLE*
4 species



*M. maxima*
Giant Kingfisher

*CERYLE*
1 species



*C. rudis*
Pied Kingfisher

*CHLOROCERYLE*
4 species



*C. amazona*
Amazon Kingfisher

## Subfamily HALCYONINAE

*LACEDO*
2 species



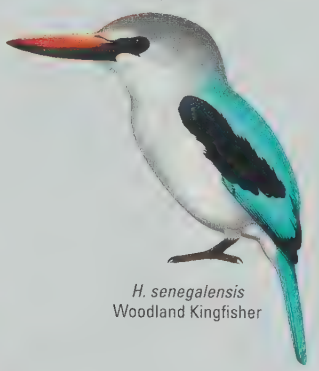
*L. pulchella*
Banded Kingfisher

*PELARGOPSIS*
3 species



*P. capensis*
Stork-billed Kingfisher

*HALCYON*
12 species



*H. senegalensis*
Woodland Kingfisher

*CARIDONAX*
1 species



*C. fulgidus*
White-rumped Kingfisher

*MELIDORA*
3 species



*M. pyrrhotis*
Collared Kingfisher

*SYMA*
2 species



*S. torotoro*
Yellow-billed Kingfisher

*TODIRAMPHUS*
25 species



*T. chloris*
Collared Kingfisher

*CITTURA*
2 species



*C. cyanotis*
Sulawesi Lilac Kingfisher

*TANYSIPTERA*
9 species



*T. galatea*
Common
Paradise-kingfisher

*DACELO*
4 species



*D. novaeguineae*
Laughing Kookaburra

*CLYTOCEYX*
1 species



*C. rex*
Shovel-billed Kingfisher

*CLYTORHYNCHUS*
3 species



*M. macrorrhina*
Hook-billed Kingfisher

# Order: Piciformes

## Families: Galbulidae, Bucconidae, Capitonidae, Ramphastidae, Semnornithidae, Lybiidae, Megalaimidae, Indicatoridae, Picidae

Piciformes is a relatively large order and is quite diverse. Piciform families range in ecology and behavior from the highly specialized woodpeckers, to toucans, to the brood-parasitic honeyguides. The families traditionally grouped as Piciformes are united by several morphological characters, including zygodactyl feet and the structure of muscles in the foot and leg (Swierczewski & Raikow 1981). Recent genetic data also provide strong evidence for the monophyly of Piciformes. Some authors split the puffbirds (Bucconidae) and jacamars (Galbulidae) into their own order, Galbuliformes, on the basis of some morphological differences (Olson 1983, Dickinson 2003, Clements 2007), but this arrangement is not supported by the larger body of evidence (Simpson & Cracraft 1981, Raikow & Cracraft 1983, Johansson & Ericson 2003, Ericson *et al.* 2006a, Hackett *et al.* 2008). Thus, we treat Piciformes here as including Galbulidae, Bucconidae, Capitonidae (New World barbets), Ramphastidae (toucans), Semnornithidae (prong-billed barbets), Megalaimidae (Asian barbets), Lybiidae (African barbets), Indicatoridae (honeyguides), and Picidae (woodpeckers). Piciformes is sister to Coraciiformes, and this clade of two orders taken together is in turn sister to Bucerotiformes (Hackett *et al.* 2008, Wang *et al.* 2012, Jarvis *et al.* 2014).



Fire-tufted Barbet, *Psilopogon pyrolophus*.
Fraser's Hill, Pahang, Malaysia. © Francesco Veronesi.



Japanese Pygmy Woodpecker, *Picoides kizuki*.
Oku area, Okinawa, Japan. © Ian Davies.

Piciformes

# GALBULIDAE
## Jacamars

5 genera · 19 species

Related Families Bucconidae (puffbirds)

Similar Birds Bee-eaters (Meropidae), motmots (Momotidae)

Description
- Plumage colorful, dominated by iridescent green upperparts in most, with rufous below
- Wings short; tail long, graduated
- Body very small to small, ovoid and slightly elongate
- Bill long, slender, usually straight, with ridge on culmen and sharp non-hooked tip
- Head large; neck short, thick
- Legs short; feet small, zygodactyl
- Males generally more brightly colored than females

Habitat Jacamars are highly arboreal, but they forage on forest edges, often along streams or clearings. They require earthen banks or termite nests in which to burrow for nesting.

Food *Jacamerops* regularly gleans prey off of foliage and branches, taking spiders and small lizards as well as insects. All other jacamars are primarily insectivorous, sit-and-wait predators that dart off a perch after aerial prey. Jacamar foraging preferences have been extensively investigated, as they are likely the selective force that reinforces the geographically varying mimicry complexes of *Heliconius* butterflies.

Breeding Most jacamars are monogamous with biparental care, and apparently offspring from preceding episodes are sometimes retained as helpers. Most are solitary nesters, but *Galbalcyrhynchus* appears to nest in small colonies, with up to 50 pairs. All jacamars are exclusively burrow-nesters, digging their own nests into banks of sand or mud, or termite nests. Females lay 2 to 4 eggs per clutch, and both sexes participate in all aspects of parental care. After 18 to 26 days of incubation, the chicks hatch with long white down, their eyes open at about six days post-hatch, and they fledge at three to four weeks of age. Their plumage is like that of the adults, but their bills keep growing for a few weeks after they leave the nest.



Rufous-tailed Jacamar, *Galbula ruficauda*. Río Cuiabá, Matto Grosso, Brazil. © D. W. Winkler.





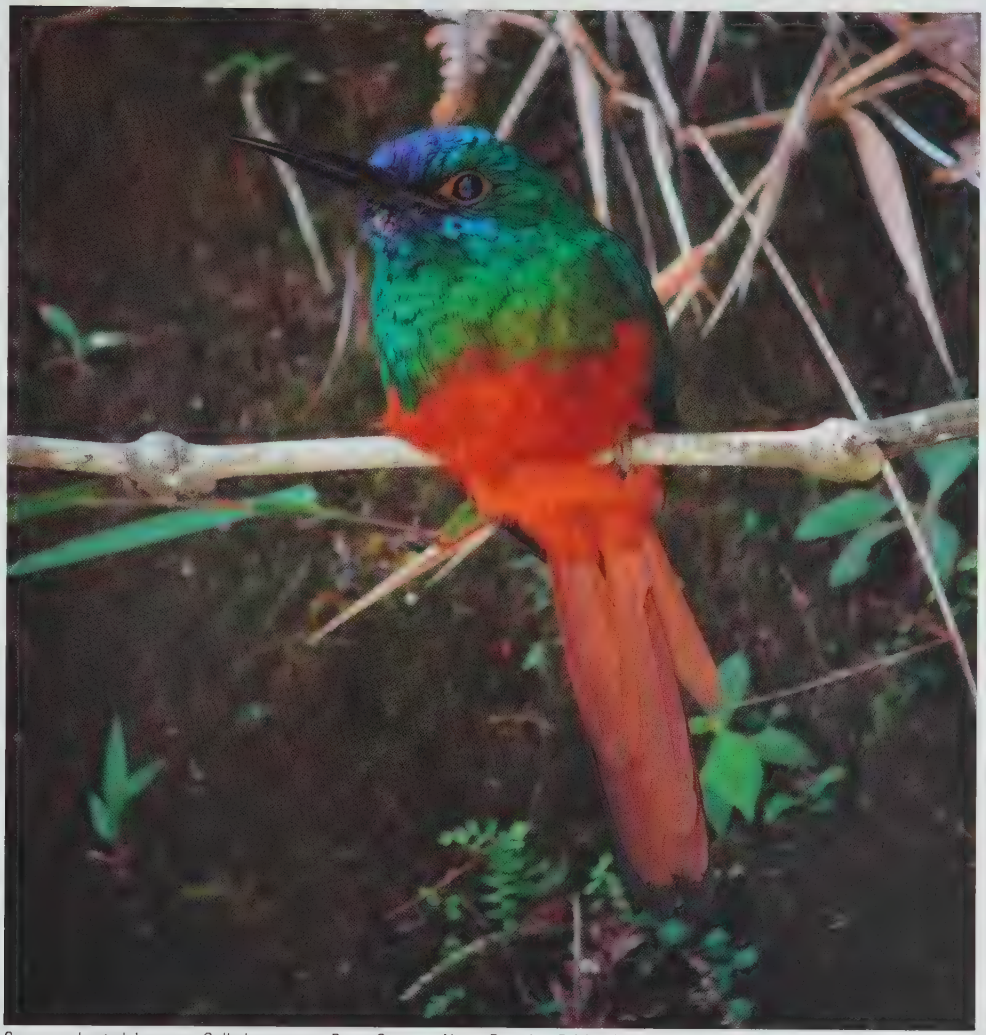
These long-billed, long-tailed birds are among the few predators in Neotropical forests skilled at capturing fast-flying butterflies and dragonflies. Like iridescent emerald bolts, jacamars dart out from their perches to snatch their prey. Indeed, their perches can often be recognized by the piles of discarded insect wings on the ground below. These birds alone have the temerity and the memory to sample even the most chemically defended butterfly species, learning details of local color patterns to find palatable prey that mimic poisonous ones. They are safe in this regard, as they usually reject defended prey by taste before ingesting them. Both sexes take food back to their young, usually in a burrow nest in a streamside bank.



Bronzy Jacamar *Galbula leucogastra*. Cerro Urania, Vaupés, Colombia. © Ian Davies.

**Conservation** All jacamars are sensitive to deforestation, but two species (11%), the Three-toed Jacamar *Jacamaralcyon tridactyla* and Coppery-chested Jacamar *Galbula pastazae*, are further handicapped by very small ranges and total population sizes (2 VU).

**Relationships** Galbulidae has most often been placed in Piciformes. Jacamars have also sometimes been moved with the puffbirds into a separate order, Galbuliformes, but we consider persuasive the evidence for keeping them in Piciformes. Within Piciformes, Galbulidae and Bucconidae are well-supported sister groups (Cracraft 1981, Simpson & Cracraft 1981, Johansson & Ericson 2003, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008) that are, taken together, sister to the remaining piciform birds.



Coppery-chested Jacamar, *Galbula pastazae*. Pacto Sumaco, Napo, Ecuador. © Nick Athanas.



Piciformes

# BUCCONIDAE
## Puffbirds

12 genera • 38 species

**Related Families** Galbulidae (jacamars)

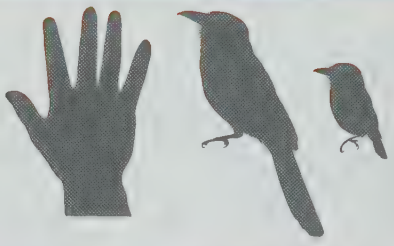
**Similar Birds** Tityras (Tityridae), kingfishers (Alcedinidae), dollarbirds (Coraciidae), butcherbirds (Artamidae)

**Description**
- Plumage generally in bold patterns of black, white, and rufous; many species with barring and distinct collars; plumage texture thick and loose-webbed
- Wings short, rounded; tail typically medium-long, rounded, and graduated
- Body small, ovoid, compact
- Bill large, robust, often hooked at tip; many with large, distinct rictal bristles
- Head large, some with hint of a crest; neck short, thick
- Legs short with zygodactyl feet
- Sexes similar

**Habitat** The puffbirds are found in forests and woodlands, from wet to dry, across their Neotropical range.



White-necked Puffbird, *Notharchus hyperrhynchus*. Tiputini Biodiversity Station, Ecuador. © D. W. Winkler.





**Food** Bucconids are primarily carnivorous, feeding on a wide variety of prey from small insects to small vertebrates, with occasional fruit and seeds taken in some species. Many have a predilection for caterpillars, scorpions, centipedes, and other noxious prey. Often sitting motionless on exposed perches for long periods of time, then sallying and subduing prey on a branch or on the ground, most bring their prey back to their perch to kill it and remove noxious parts by repeated swipes on a branch. Only *Chelidoptera* grasps and swallows smaller prey in the air.

**Breeding** Puffbirds are monogamous with biparental care. Some species of nunbirds are cooperative breeders, with young from previous nesting attempts helping the breeding pair with territory defense and chick feeding. Most puffbirds construct their nests in the ground, digging their burrows either in an earthen bank or directly into gently sloping ground. Some species build their tunnels in termite nests. Puffbirds lay 2 or 3 eggs. Both sexes dig the burrow, and the bird not digging often stands guard, both birds disappearing silently whenever disturbed. Both parents share in incubating the eggs and feeding the chicks, though the male appears to brood the chicks early on while the

Puffbirds are patient sit-and-wait predators of large invertebrates and small vertebrates in forested Neotropical habitats. With large heads and robust bills, often with a distinct hook, they recall the forest kingfishers of the Eastern Hemisphere. Most species are either boldly marked in black and white or streaked and spotted in browns and grays. The latter species are most likely to sport profuse rictal bristles and lax plumage, giving these birds a disheveled, puffy look. The bristles around the face are probably more to protect the eyes from the stings of prey rather than to aid in catching them. Their eyes are large, and the birds often forage well into the crepuscular hours in deep forest.



White-eared Puffbird, *Nystalus chacuru*. Santa Cruz, Bolivia. © Dubi Shapiro.

female takes the greater share of provisioning duties from these early days throughout the chick-rearing period. The chicks hatch blind and naked yet remarkably mobile, and when only a few days old, they venture to the burrow entrance to receive food from the parents. They leave the nest after three to four weeks, and are still fed by the parents outside the nest for another month or so.

**Conservation** Puffbirds, like other forest birds, are sensitive to deforestation and habitat alterations. The three bucconid species (8%) that are of greatest conservation concern (2 NT, 1 EN) all have small ranges on or near a coast with substantial pressure from coastal development.

**Relationships** Puffbirds are part of the large piciform radiation, within which they are the sister group of the jacamars (Simpson & Cracraft 1981, Johansson & Ericson 2003, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008). Bucconidae and Galbulidae taken together are sister to the remaining piciform families.



Swallow-winged Puffbird, *Chelidoptera tenebrosa*. Mitú, Vaupés, Colombia. © Ian Davies.



White-whiskered Puffbird, *Malacoptila panamensis*. Tortí, Panama. © Nick Athanas.

*Notharchus*
7 species



*N. hyperrhynchus*
White-necked Puffbird

*Cyphos*
1 species



*C. macrodactylus*
Chestnut-capped Puffbird

*Nystactes*
2 species



*N. tamatia*
Spotted Puffbird

*Bucco*
1 species



*B. capensis*
Collared Puffbird

*Nystalus*
4 species



*N. chacuru*
White-eared Puffbird

*Hypnelus*
2 species



*H. ruficollis*
Russet-throated Puffbird

*Malacoptila*
8 species



*M. rufa*
Rufous-necked Puffbird

*Micromonacha*
1 species



*M. lanceolata*
Lanceolated Monklet

*Monasa*
4 species



*M. morphoeus*
White-fronted Nunbird

*Hapaloptila*
1 species



*H. castanea*
White-faced Nunbird

*Nonnula*
6 species



*N. ruficapilla*
Rufous-capped Nunlet

*Chelidoptera*
1 species



*C. tenebrosa*
Swallow-winged Puffbird

Piciformes

# CAPITONIDAE
## New World Barbets

2 genera · 18 species

**Related Families** Ramphastidae (toucans), Semnornithidae (prong-billed barbets)

**Similar Birds** Other barbets (Megalaimidae, Lybiidae, Semnornithidae)

**Description**
- Plumage boldly patterned and often brightly colored, dominated by green, red, yellow, white, or black
- Wings medium length; tail medium, square
- Body small, ovoid
- Bill short to medium, moderately deep; rictal bristles very few to moderate
- Head medium to large; neck short, thick
- Legs and feet short, stout
- Males more brightly colored than females

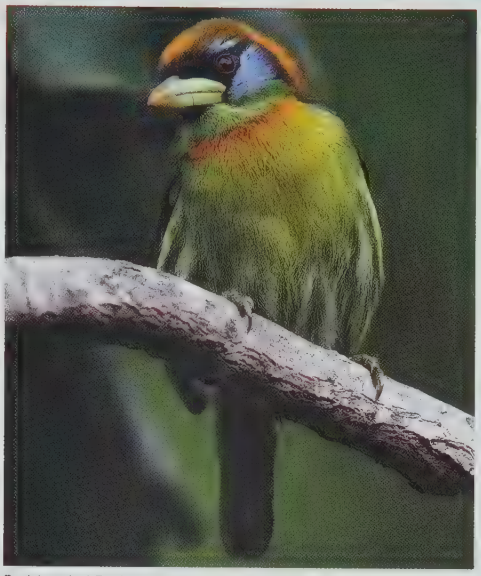
**Habitat** All New World barbets live in the forests of South America and southern Central America, from hot lowland gallery forests to cooler mid-montane cloud forests.

**Food** Capitonids feed on a variety of foods; their diets include fruits and at least some insects and other invertebrates, some of which can be quite large.

**Breeding** Most barbets appear to be monogamous, and during their long courtship period the pair excavates a nest cavity and the male courtship-feeds the female. All barbets nest in cavities that they excavate out of dead wood. The nests of only a quarter of capitonid species have been described, but it appears that females typically lay 2 to 5 eggs. As with most cavity-nesting birds, the eggs are white. Both sexes incubate the eggs, and both help raise the young. Incubation takes about two weeks, and the young fledge after a month or six weeks.

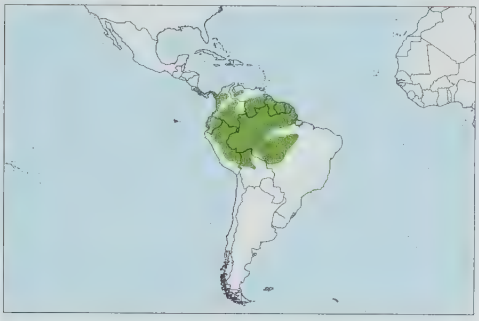
**Conservation** South American forests are generally facing considerable change, and the eight New World barbet species (44%) that are of considerable conservation concern (4 NT, 4 VU) are dominated by those with very small ranges.

**Relationships** Recent molecular studies have shown Capitonidae to be closest to Ramphastidae and Semnornithidae, but sister relationships among these three are not yet clear. This clade of three families appears to be sister to Lybiidae of Africa, with those four families taken together being sister to Megalaimidae of Asia (Barker & Lanyon 2000, Moyle 2004). The entire barbet/toucan group as a whole is allied to the clade made up of Picidae plus Indicatoridae (Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008), with which these birds seem robustly placed together in Piciformes.



Red-headed Barbet, *Eubucco bourcierii*. Volcán, Chiriqui, Panama. © John McKean.





Capitonids are birds of humid Neotropical forests, and their plumage has perhaps the greatest diversity of color and boldest patterns of any of the barbet families, with plumages dominated by green, red, yellow, white, or black, contrasting in bold patches rather than fine detail. Their rictal bristles are relatively sparse and short compared to barbets of the Old World. Like many of their piciform cousins, they nest in tree cavities excavated by both members of the pair. New World barbets spend most of their time high up in trees foraging on fruit clusters or searching dead leaves for insects, and their presence is sometimes first revealed by rhythmic calls of throaty whistled notes, much like those of a small owl.



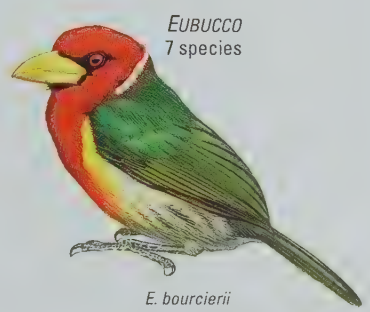
Scarlet-banded Barbet, *Capito wallacei*. Plataforma, San Martin, Peru. © Dubi Shapiro.

*CAPITO*
11 species



*C. auratus*
Gilded Barbet

*EUBUCCO*
7 species



*E. bourcierii*
Red-headed Barbet

Piciformes

# RAMPHASTIDAE
## Toucans

5 genera · 50 species

Related Families Capitonidae (New World barbets), Semnornithidae (prong-billed barbets)

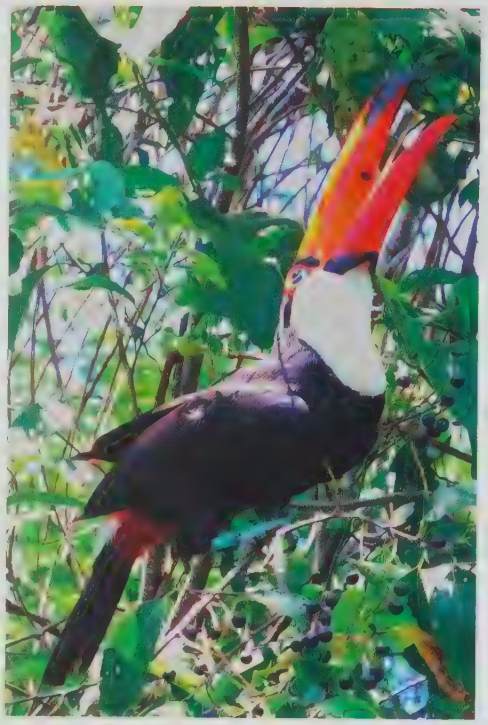
Similar Birds Hornbills (Bucerotidae)

Description
- Plumage boldly patterned; upperparts most commonly black (sometimes blue, gray, or green) with contrasting yellow, white, or red below
- Wings medium length, deep, rounded; tail long, graduated, often rounded
- Body ovoid, small to medium
- Bill long, broad, and deep, serrate, slightly decurved, and colored with patches of blue, green, yellow, chestnut, orange, or red
- Head medium-large; bare skin around eye brightly colored in hues like bill's; neck short and thick
- Legs and feet short, stout, with zygodactyl toes
- Sexes similar

Habitat Ramphastids are found in a wide variety of wooded habitats, from lowland rainforest through open woodlands to montane cloud forest.

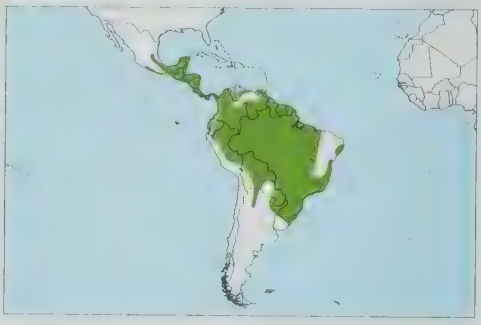
Food Most ramphastids are primarily frugivorous, but they also take insects, small vertebrates (primarily lizards and frogs), and bird eggs and chicks. Toucans swallow their food by positioning the food item in the tip of their bill, then tossing the item back into their throat. Some prey items are too large to throw back in a single bolus; these the bird will hold with the feet and pick apart with the bill before tossing them back to swallow.

Breeding Toucans are monogamous with biparental care. Several species breed cooperatively. In these, only the breeding pair incubates, preventing the helpers from accessing the nest until the chicks have hatched. All ramphastids nest in natural cavities, either cavities that have been excavated by other birds or, much less commonly, those that they excavate for themselves in soft, rotted wood. Nests are typically lined with wood chips and regurgitated seeds of fruit. Females lay 1 to 5 eggs. Both male and female typically incubate the eggs and feed the chicks. Incubation takes 15 to 18 days, and the naked chicks hatch blind, not opening their eyes for at least two weeks, and as much as four. The



Toco Toucan, *Ramphastos toco*.
Iguazú NP, Argentina. © D. W. Winkler.





Small to medium-sized non-passerines with enormous and colorfully patterned bills, toucans have become familiar to many through their frequent appearance in popular culture and marketing. They eat a great deal of fruit, but they also supplement this diet with large amounts of animal material. In many areas in the Neotropics, toucans are some of the most important predators on the nests of other birds, and they are sometimes the focus of intense aggression by bands of passerine birds. The distinctive bill, with nostrils atop the very base, serves with its large radiative surface to shed excess heat for the many species that spend much time in the upper forest canopy exposed to the hot tropical sun.



Many-banded Araçari, *Pteroglossus pluricinctus*. Yasuni NP, Ecuador. © Ian Davies.

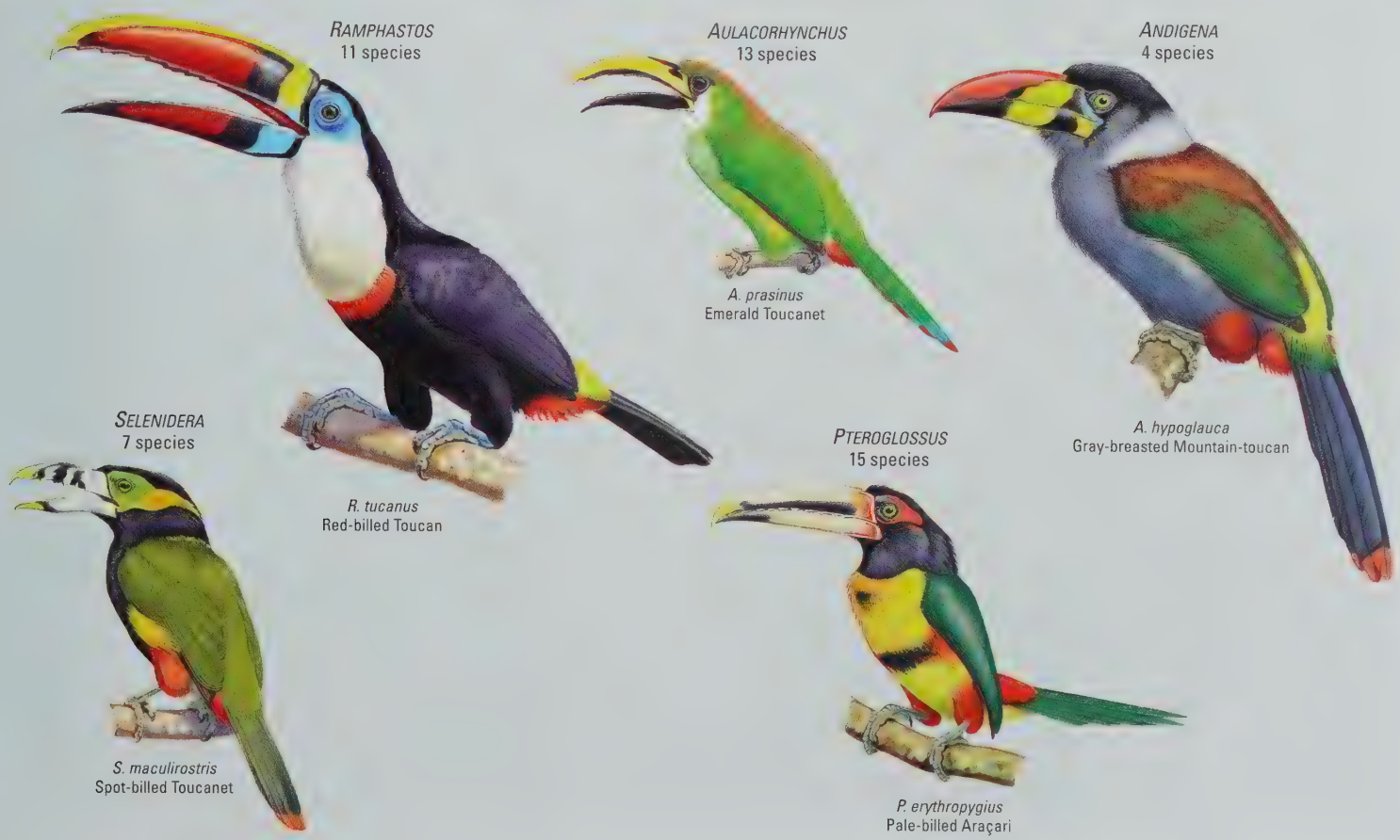
nestling period is fairly long, ranging from 40 to 60 days, and the fledglings can be fed by the parents or helpers for up to six weeks or so after leaving the nest.

**Conservation** As birds of Neotropical forests, ramphastids face the same destruction and degradation of these habitats faced by other birds. In addition, these birds are actively hunted and trapped, both for food and traditional medicine, and for the pet trade. The extreme cohesiveness of the family groups of many species makes them very easy quarry for human hunters. For these reasons 11 ramphastid species (22%) are of direct conservation concern (5 NT, 3 VU, 3 EN). The most endangered of these either have very small ranges or live in areas that are heavily affected by growing human populations.

**Relationships** The toucans have long been placed in Piciformes. Though their affinity to the barbets has long been clear, and earlier hypotheses placed the toucans as sister to all the barbets (Cracraft 1981), more recent molecular studies indicate that Ramphastidae is closest to the two barbet groups in the Western Hemisphere, Capitonidae and Semnornithidae. Unfortunately, the relationships among these three groups are not quite clear (Barker & Lanyon 2000, Moyle 2004), and we have opted, with others, to retain three separate families in this clade, and thus five barbet (and toucan) families total (Clements 2007, Remsen *et al.* 2009, del Hoyo & Collar 2014, Gill & Donsker 2014), rather than place them all into one single large barbet clade (Dickinson 2003, Cracraft 2013). This large group is then sister to the clade made up of the woodpeckers plus honeyguides (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Spot-billed Toucanet, *Selenidera maculirostris*. Itatiaia NP, Brazil. © Kevin Schafer.



Piciformes

# SEMNORNITHIDAE
## Prong-billed Barbets

1 genus • 2 species

**Related Families** Capitonidae (New World barbets), Ramphastidae (toucans)

**Similar Birds** Other barbets (Capitonidae, Megalaimidae, Lybiidae)

**Description**
- Largely yellow-olive, with contrasting red, yellow, and gray underparts in *Semnornis ramphastinus*
- Wings rounded; tail medium length, square
- Body small, ovoid, stocky
- Bill medium length, deep, and slightly inflated in profile, with a fine sharp dorsal hook at tip fitting into tiny notch at the tip of lower bill
- Head medium-sized; neck short, thick
- Legs and feet medium length and stout; toes zygodactyl
- Sexes similar

**Habitat** Both *Semnornis* barbets inhabit wet montane forest, making extensive use of second growth.

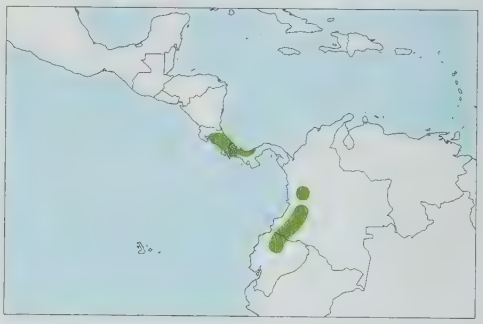
**Food** As in capitonids, fruit makes up the majority of the diet of semnornithid barbets, and it appears that they take insects only when fruit is not available or when feeding small nestlings. When eating fruit, they eat small fruit whole, but they pluck the flesh from larger fruits, leaving behind the impassable seeds.

**Breeding** Both *Semnornis* barbets are obligate cavity-nesters, and they excavate the cavities themselves, usually in dead trees. Both species are monogamous with biparental care, and cooperative breeding with retained helpers seems to be the norm in Toucan Barbets *S. ramphastinus*. Females lay 1 to 5 eggs, and both parents, and helpers if present, share in all aspects of parental care. Incubation takes about two weeks, and the naked and blind nestlings develop slowly at first, still blind and naked nine days post-hatch. The length of the nestling period is apparently not documented, but the young can stay dependent on the parents (and helpers) for up to 140 days post-hatch.



Prong-billed Barbet, *Semnornis frantzii*. Poas Volcano area, Costa Rica. © Kevin Schafer.





**Conservation** One species (50%), the Toucan Barbet, is declining due to habitat destruction and modification throughout a small range in the Andes (1 NT). The Prong-billed Barbet *S. frantzii* in Central American forests faces no immediate conservation concerns.

**Relationships** The two species of *Semnornis* are the sole members of the Semnornithidae, and they are most closely related to the New World barbets and the toucans, but not demonstrably closer to one than the other (Barker & Lanyon 2000, Moyle 2004). This lack of a clear closer sister relationship within this group of three clades is the basis for recognizing Semnornithidae as a separate family. In any event, this clade of three families is in turn sister to Lybiidae, and these four taken together are sister to Megalaimidae (Barker & Lanyon 2000, Moyle 2004). All of these barbets (and toucans) taken together are sister to the clade that is composed of the woodpeckers and honeyguides (Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008).

These two barbets appear to represent a deep branch in the history of the New World barbets and toucans. They have fewer and finer rictal bristles than most barbets, and the fine tip of the upper bill fits into a tiny notch at the tip of the lower bill. In coloration they are not at all alike, one mostly muted green and the other named for its similarity to a very small multicolored toucan. Like other barbets, these birds eat mostly fruit but supplement their diets with insects and invertebrates, and they nest in tree cavities of their own construction. Their calls are less whistled than those of other New World barbets, throatier and brassier, more like the calls of a small ramphastid than a capitonid.



Toucan Barbet, *Semnornis ramphastinus*. Refugio Paz de las Aves, Pichincha province, Ecuador. © Nick Athanas.

*SEMNORNIS*
2 species



*S. ramphastinus*
Toucan Barbet

Piciformes

# LYBIIDAE
## African Barbets

10 genera • 52 species

**Related Families** Semnornithidae (prong-billed barbets), Capitonidae (New World barbets), Ramphastidae (toucans)

**Similar Birds** Other barbets (Capitonidae, Megalaimidae, Semnornithidae)

**Description**
- Plumage boldly patterned, often with areas of finer detail, mostly in black, red, yellow, and white
- Wings medium length, rounded; tail medium length, square
- Body short ovoid, very small to small
- Bill large, heavy, often with tomial teeth; species vary in number and size of rictal bristles
- Head small to large; neck short, thick
- Legs and feet short, stout; toes zygodactyl
- Males brighter and more boldly patterned than females in a few species

**Habitat** African barbets are found in diverse habitats in sub-Saharan Africa, ranging from rainforest to savannah.

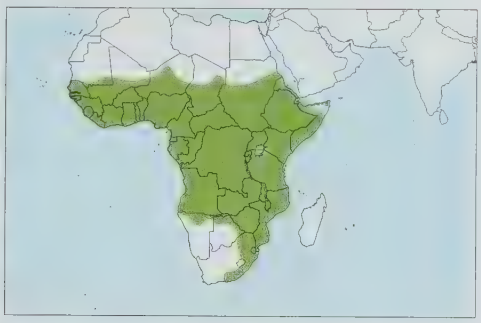
**Food** Like other barbets, lybiids feed on a great variety of fruits, particularly figs (*Ficus*) when they are available. Perhaps more so than other barbets, lybiids include many insects and other invertebrates in their diets; different species actively glean insects from the ground and branches, and quite a few species catch insects from the air.

**Breeding** Most lybiids appear to be monogamous with biparental care, and apparently all genera but *Pogoniulus* and *Trachylaemus* are cooperative breeders at least some of the time. Some, like *Gymnobucco*, are colonial as well, with other lybiid species sometimes nesting in the same colony. All lybiids nest in cavities that they excavate out of dead wood, or, in the case of the ground barbets (*Trachyphonus*), in the side of a bank or termite mound. Among the three-quarters of African barbet species whose nests have been described, clutch size varies from 1 to 7 eggs, with 3 probably being the most common. Nests of many species are protected full-time by individuals who rotate through guard duty, protecting against predators and brood-parasitic honeyguides (especially *Indicator minor*). As with most cavity-nesting birds, the eggs are white. Both sexes (and sometimes helpers) incubate the eggs and provision the young. Lybiids keep their nest cavity tidy, removing discarded fruit pits, skins, and fecal sacs. Incubation takes 12 to 18 days. The nestlings are fed mostly insects at first, but more and more fruit as they develop through the nestling period of 20 to 35 days. In the few species reported in sufficient detail, young leave the parental territory about two months after fledging.



White-eared Barbet, *Stactolaema leucotis*. Near Umhlanga, KwaZulu-Natal, South Africa. © John McKean.





From the tiniest tinkerbird with a dainty bill to the largest *Pogonornis* barbet with a hefty toothed bill, this is the most morphologically diverse barbet family. Lybiids are also the most variable of the barbets in rictal bristle development and extent of facial feathering; some species have completely naked heads and in others the bills are almost totally obscured by a profusion of long, adpressed bristles. Lybiids include the only barbets to spend a great deal of time on the ground, and some species burrow into earthen banks to nest rather than using the tree cavities preferred by all other barbets. Although they eat lots of fruit, these also may be the most insectivorous of all barbets.



Red-and-yellow Barbet, *Trachyphonus erythrocephalus*. Negele area, Oromia, Ethiopia. © Ian Davies.

**Conservation** Habitat destruction and alteration are threatening lybiids, but only three lybiid species (6%) are of immediate conservation concern (1 NT, 1 VU, 1 DD). Two of these have very small ranges, and the data-deficient species, the White-chested Tinkerbird *Pogoniulus makawai*, is known from only a single specimen in Zambia.

**Relationships** Although long recognized as closely related to the other barbets of the world, detail on how these groups were related to each other has only recently been clarified by analyses of DNA sequence data. Lybiidae, the most diverse of the barbet families, appears to be sister to a clade that contains all the New World barbets and toucans: Capitonidae, Ramphastidae, and Semnornithidae (Moyle 2004). These four taken together are in turn sister to Megalaimidae.



White-headed Barbet, *Lybius leucocephalus*. Masai Mara Game Reserve, Kenya. © Con Foley.

## Subfamily TRACHYPHONINAE

*TRACHYPHONUS*
6 species

*T. erythrocephalus*
Red-and-yellow Barbet

*STACTOLAEMA*
4 species

*S. leucotis*
White-eared Barbet

*LYBIUS*
9 species

*L. torquatus*
Black-collared Barbet

## Subfamily LYBIINAE

*BUCCANODON*
1 species

*B. duchaillui*
Yellow-spotted Barbet

*CRYPTOLYBIA*
1 species

*C. olivacea*
Green Barbet

*GYMNOBUCCO*
6 species

*G. calvus*
Naked-faced Barbet

*POGONIULUS*
10 species

*P. atroflavus*
Red-rumped Tinkerbird

*TRICHOLAEMA*
6 species

*T. leucomelas*
Acacia Pied Barbet

*POGONORNIS*
6 species

*P. bidentatus*
Double-toothed Barbet

*TRACHYLAEMUS*
3 species

*T. purpuratus*
Eastern Yellow-billed Barbet

Piciformes

# MEGALAIMIDAE
## Asian Barbets

2 genera • 35 species

**Related Families** Semnornithidae (prong-billed barbets), Capitonidae (New World barbets), Ramphastidae (toucans), Lybiidae (African barbets)

**Similar Birds** Other barbets (especially Capitonidae, Semnornithidae), woodpeckers (Picidae)

**Description**
- Plumage boldly patterned around the head, otherwise dominated by green
- Wings rounded; tail medium length, square
- Body small, ovoid, stocky
- Bill large, heavy, often with tomial teeth; most species with rictal bristles
- Head medium to large; neck short, thick
- Legs and feet short, thick
- Sexes mostly similar

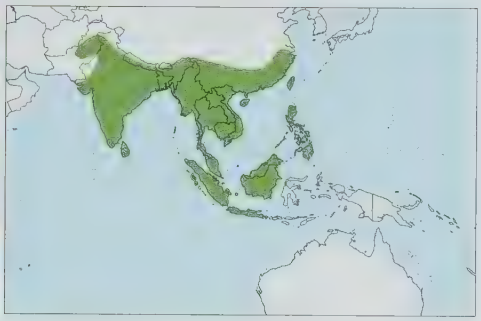
**Habitat** The Asian barbets are primarily birds of forested regions, occurring in both primary and secondary evergreen and deciduous forests from the lowlands up through mountain slopes. Some species are found in edge and scrubland habitats, as well as gardens, orchards, and other human-modified environements.

**Food** Megalaimids have varied diets, though some feed primarily on fruits for much of the year. Many rely heavily on figs (*Ficus*). Barbets regurgitate the pits of the fruits they eat, and are thus important dispersers of seeds for many species. These barbets also feed on insects and other invertebrates, especially when insect hatches lead to high densities of prey. In addition, they also take small vertebrates, such as frogs.



Green-eared Barbet, *Psilopogon faiostrictus*.
Baan Song Nok, near Kaeng Krachan NP, Thailand. © Alex Vargas.





**Breeding** Most Asian barbets appear to be monogamous, and some species are cooperative breeders. Asian barbets, like other barbets, primarily nest in cavities that they themselves excavate, with both males and females participating in the effort. Cavities are constructed in soft dead wood in branches or snags, or occasionally in termite nests. Generally, no nest material is brought into the nest cavity. Asian barbets lay 1 to 6 eggs. Both male and female help with nest construction, incubation, and feeding chicks. In those cooperative-breeding species, helpers

In appearance, the Asian barbets are probably the most uniform of all the barbets, almost all having well-developed rictal bristles, mostly green (or at least olive-brown) plumage, and some contrasting pattern of primary colors around the head. Their green plumage and affinity for canopy fruiting clusters keeps them out of sight in their forest habitats of Asia, but once their calls are known, one gets an appreciation of just how common they are; their rhythmic cadences of cuckoo-like whistles are probably the most consistently heard bird sound in Southeast Asian forests.



Blue-throated Barbet, *Psilopogon asiaticus*. Kaeng Krachan NP, Thailand. © Con Foley.



Golden-throated Barbet, *Psilopogon franklinii*. Zhemgang, Bhutan. © Francesco Veronesi.



Lineated Barbet, *Psilopogon lineatus*. Eng Neo, Singapore. © Con Foley.

also incubate and feed the chicks. Incubation appears to take about two weeks or a little longer. The chicks, naked at first, grow rather slowly, and they generally fledge after about five to six weeks in the nest.

**Conservation** There are no immediate conservation concerns for the Asian barbets. However, habitat destruction in southern Asia is increasing at an alarming rate and may lead to serious population declines for some species, especially those that already have restricted ranges.

**Relationships** Asian barbets have at times been placed in a single large family with the other barbets of South America and Africa, but recent work has shown that the barbets of the world, without toucans, do not represent a monophyletic group. The Asian barbets are sister to the clade that contains the remaining families of barbets and toucans (Barker & Lanyon 2000, Moyle 2004). The brown barbets (*Caloramphus*) of Borneo and the Malay Archipelago may be an even older lineage that is sister to all other barbets and toucans, but we include it here in Megalaimidae (Moyle 2004).

Subfamily **CALORAMPHINAE**

*CALORAMPHUS*
2 species



*C. fuliginosus*
Bornean Brown Barbet

Subfamily **MEGALAIMINAE**

*PSILOPOGON*
33 species



*P. rafflesii*
Red-crowned Barbet

Piciformes

# INDICATORIDAE
## Honeyguides

4 genera • 16 species

**Related Families** Picidae (woodpeckers)

**Similar Birds** Drab bulbuls (Pycnonotidae), drab flycatchers (Muscicapidae)

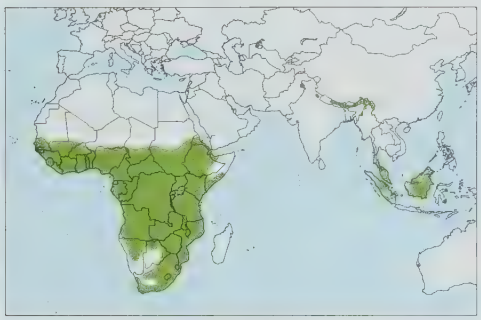
**Description**
- Plumage dull, typically light gray or brown below with yellow or olive on back and wings; skin unusually thick
- Wings long, pointed; tail long and graduated, with modified outwardly flared rectrices in one species
- Body very small, fusiform
- Bill short and stout; nostrils with raised rims
- Head small; neck short
- Legs medium-short, thick; feet thick and zygodactyl toes with strongly curved long claws
- Sexes similar

**Habitat** The honeyguides live in a range of forested and woodland habitats, from montane and temperate forests to more open tropical forests and savanna.



Greater Honeyguide, *Indicator indicator*. Tsavo West NP, Kenya. © Nik Borrow.





**Food** Honeyguides have perhaps one of the most specialized and intriguing diets of any bird. Beeswax is the primary food item of honeyguides, the digestion of which is completed with a special arsenal of enzymes. Additional food includes insects (particularly scale insects) and small amounts of fruit and honey.

**Breeding** The honeyguides are obligate brood parasites. Most species are polygynous, with males singing, displaying, and mating with several females. Females may mate with more than one male. Honeyguides lay their eggs in the nests of other cavity-nesters, particularly bee-eaters, rollers, kingfishers, and barbets. Female honeyguides lay only a single egg in the nest of each host. A female Greater Honeyguide *Indicator indicator* often punctures the eggs of the host to help ensure that her own chick receives all the food delivered to the nest. In a given year, a female may lay 20 eggs, in clutches of 3 or 4. Upon hatching, the honeyguide chick kills any remaining host nestlings with a sharp hook on its bill. Honeyguides provide no parental care to their chicks, instead leaving all parental responsibilities to the host parents.

**Conservation** Because honeyguides are unobtrusive and easy to overlook, their populations are difficult to assess, but four species (25%)

Honeyguides lay their eggs in the nests of barbets, kingfishers, and other cavity-nesters, and the young hatch with hooks on their bills that they use to kill their brood-mates before their own eyes even open. Although they are fed a diverse diet by their various host-parents, they embark on a lifelong diet of honey, beeswax, and insects after fledging. The largest species, *Indicator indicator*, has evolved the habit of leading large mammals (including humans) to bee hives, where it feeds on the wax, honey, and larvae after the mammals have moved on. Honeyguides have relatively dull plumage and generally inconspicuous behavior that makes them unobtrusive near their would-be hosts.



Scaly-throated Honeyguide, *Indicator variegatus*. Hluhluwe, KwaZulu-Natal, South Africa. © Hugh Chittenden.

are of some concern (3 NT, 1 DD). The Yellow-footed Honeyguide *Melignomon eisentrauti* has so few records, and from such widely scattered localities in West Africa, that it is considered data deficient. The other species of concern are on the edge of being threatened by habitat alteration in lowland forest or montane habitats in limited ranges.

Relationships The honeyguides have traditionally been placed in the order Piciformes, even though externally their only really piciform feature is their zygodactyl feet. Indicatoridae is strongly supported, however, as sister group to Picidae by numerous molecular and morphological studies (Simpson & Cracraft 1981, Johansson & Ericson 2003, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008). The woodpecker/honeyguide group is in turn allied to the various toucan and barbet families, and all of these taken together are sister to the clade made up of Galbulidae plus Bucconidae (Ericson *et al.* 2006a, Hackett *et al.* 2008).



Lesser Honeyguide, *Indicator minor*. Eshowe, KwaZulu-Natal, South Africa. © Hugh Chittenden.

*PRODOTISCUS*
3 species



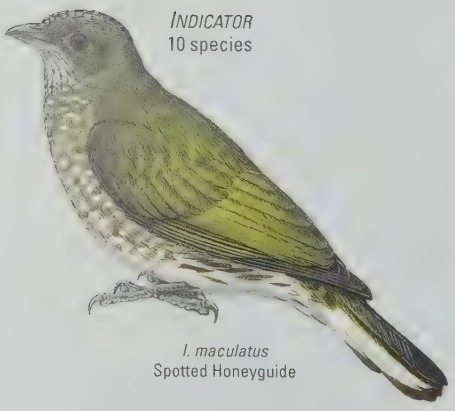
*P. zambesiae*
Green-backed Honeybird

*MELIGNOMON*
2 species



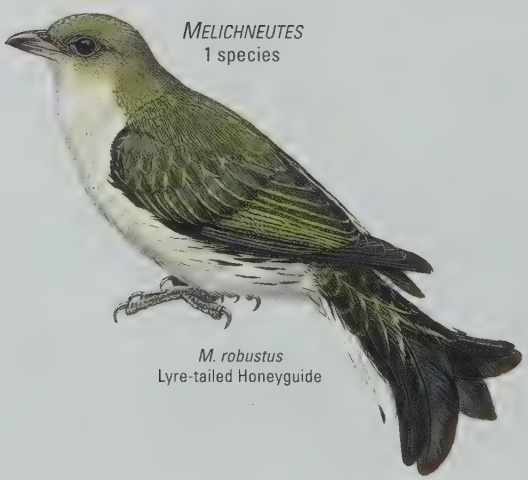
*M. eisentrauti*
Yellow-footed Honeyguide

*INDICATOR*
10 species



*I. maculatus*
Spotted Honeyguide

*MELICHNEUTES*
1 species



*M. robustus*
Lyre-tailed Honeyguide

Piciformes

## PICIDAE
### Woodpeckers

33 genera • 254 species

**Related Families** Indicatoridae (honeyguides)

**Similar Birds** Treecreepers (Climacteridae), woodcreepers (Furnariidae)

**Description**
- Plumage typically boldly patterned; black, white, and red dominant in most species, with yellow, green, and brown dominant in many
- Wings medium-long, broad; rectrices stiff, point-tipped except in piculets and wrynecks
- Body very small to medium, ovoid, often elongate
- Bill medium length, straight, chisel-like
- Head large; neck medium-long, thick
- Legs short, thick; zygodactyl toes long, thick, with sharply curved claws
- Males often with more red on head

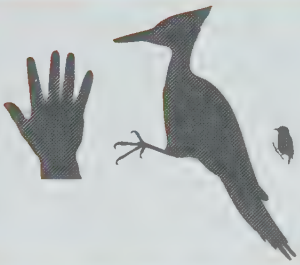
**Habitat** Woodpeckers live in a wide variety of habitats, from high mountains to low deserts and from open grasslands and savannas to dense, old-growth forests.

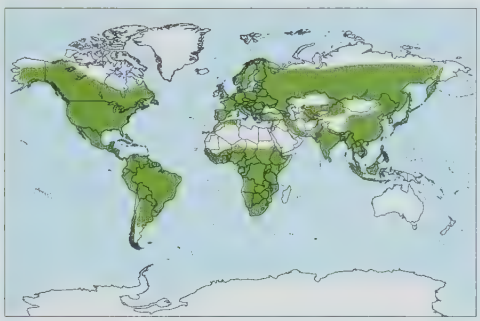
**Food** Most woodpeckers feed primarily on insects and other arthropods that are gleaned or excavated by chiseling or hammering from bark or branches and occasionally caught in mid-air. Many species supplement their diet with seeds, nuts, fruit, and nectar. The large family also includes many species with specialized foraging strategies, such as the sapsuckers (*Sphyrapicus*), which specialize on sap harvested from trees; many species that specialize on ants (*Colaptes*, *Picus*, and *Jynx*); and some, such as the Acorn Woodpecker *Melanerpes formicivorus*, that store acorns in thick-barked trees for use throughout the winter.

**Breeding** Most woodpeckers are monogamous with biparental care. Several species, including the Red-cockaded Woodpecker *Leuconotopicus borealis* and Acorn Woodpecker, are cooperative breeders. In addition, the Acorn Woodpecker is polygynandrous, with multiple males mating with multiple females and up to three females laying their eggs in the same cavity. Almost all woodpeckers excavate their own nest cavities in trees, and many dig a new hole every year, creating a niche for a diverse guild of cavity-adopters in other families of birds. Where woodpeckers are found in areas with no trees, they find alternate nesting sites, such as large cacti, termite nests, or tunnels in the ground. Nest chambers are not lined with any additional material, with the exception of woodchips produced during excavation. As with many other cavity-nesting

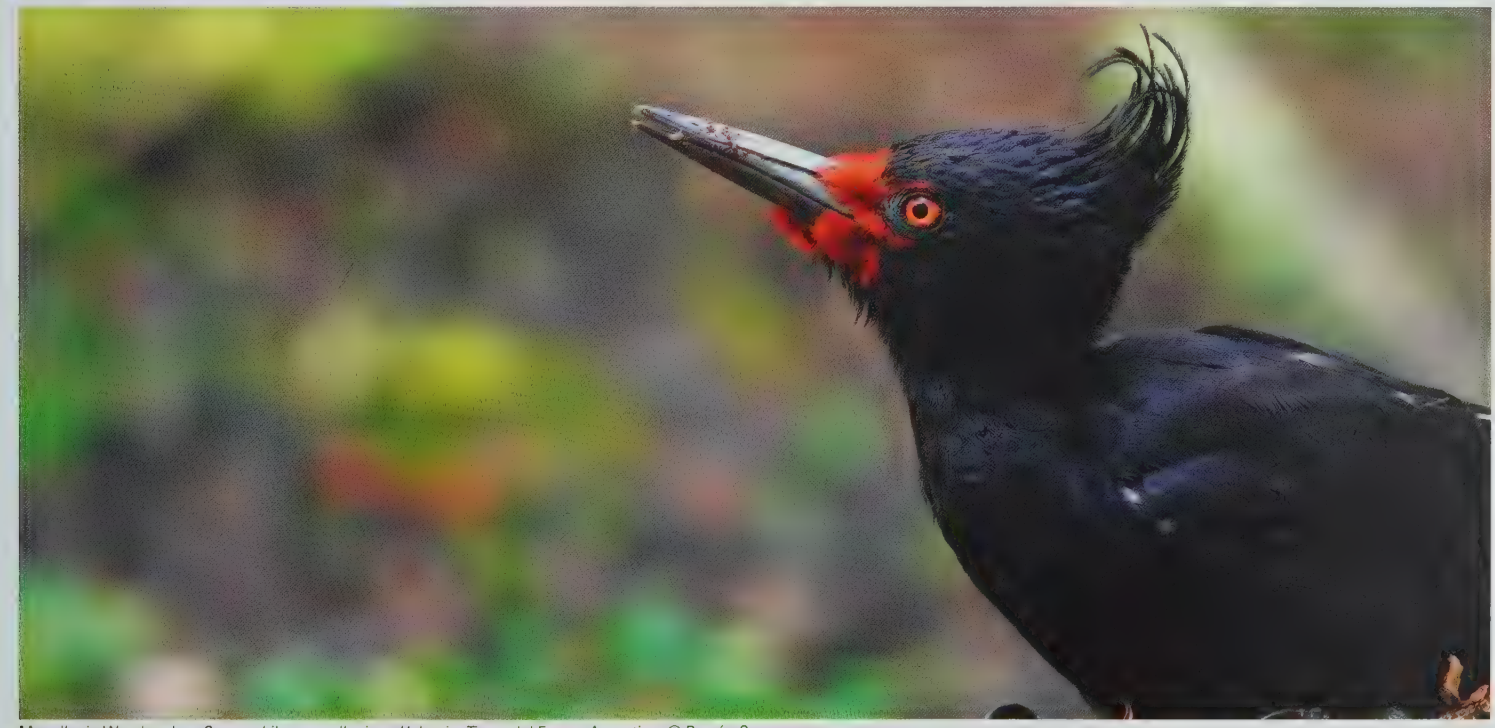


Laced Woodpecker, *Picus vittatus*. Pasir Ris, Singapore. © Con Foley.





Woodpeckers have diversified into every treed habitat on Earth except for Madagascar and Australasia (east of Wallace's line), and ground-living woodpeckers even occur in treeless areas of the Southern Hemisphere. Most woodpeckers have a skull that is reinforced at the bill base, a tongue that wraps clear around the rear of the skull into one of the eye sockets or nostrils, a stiff-pointed tail, and zygodactyl toes. Unusual woodpeckers include the piculets, tiny nuthatch-like denizens of tropical woods, and the Old World wrynecks, which writhe and stretch and hiss like a snake when threatened. Surprisingly, woodpeckers seldom reuse their nest cavities, and many species of cavity-adopting birds depend on the surplus holes that these birds produce.



Magellanic Woodpecker, *Campephilus magellanicus*. Ushuaia, Tierra del Fuego, Argentina. © Ramón Casares.

birds, the eggs are white. Female woodpeckers lay 2 to 12 eggs. Both males and females are active in nest construction, incubation, and feeding chicks. Males typically incubate the eggs at night. After an incubation period of only nine to 14 days, the young hatch naked and bypass a downy plumage by molting directly into an adult-like juvenile plumage. They are brooded by the parents at first, but they grow relatively quickly and fledge in three to four weeks.

**Conservation** Given their reliance on forested habitats, it should be no surprise that 42 species of woodpeckers (17%) face conservation concern (24 NT, 9 VU, 6 EN, 2 CR, 1 CR(PE)). These include two spectacular large species that are critically endangered if not extinct, Ivory-billed and Imperial Woodpeckers *Campephilus principalis* and *C. imperialis*, respectively. Most other woodpeckers and piculets considered endangered are species that are suffering from the alteration of forest or woodland habitats, together with limited ranges—often on islands like Cuba or Okinawa—that handicap their ability to sustain this impact. The endangered Kaempfer's Woodpecker *Celeus obrieni* was known for many decades from only a single specimen until recent field work discovered it in several disjunct places in central Brazil.

**Relationships** The woodpeckers are included in Piciformes, and there is now good evidence that Galbulae is sister to Indicatoridae within that order (Simpson & Cracraft 1981, Johansson & Ericson 2003, Ericson *et al.* 2006a, Livezey & Zusi 2007, Hackett *et al.* 2008). This woodpecker/honeyguide group is in turn allied to the clade comprising all the barbets and toucans (Ericson *et al.* 2006a, Hackett *et al.* 2008). Within Picidae, the distinctive wrynecks (*Jynx*) of Eurasia and Africa are sister to all other woodpeckers (Benz *et al.* 2006, Fuchs *et al.* 2007a). In turn, the *Sasia* and *Picumnus* piculets—a pan-tropical group of very small, short-tailed woodpeckers—are sister to the remaining group of all other woodpeckers (which includes the Antillean Piculet *Nesoctites micromegas*).



Rufous Piculet, *Sasia abnormis*. Sepilok, Sabah, Borneo. © Alex Vargas.

Subfamily **JYNGINAE**

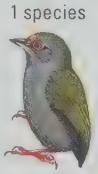
*JYNX*
2 species



*J. torquilla*
Eurasian Wryneck

Subfamily **PICUMNINAE**

*VERREAUXIA*
1 species



*V. africana*
African Piculet

*SASIA*
2 species



*S. ochracea*
White-browed Piculet

*PICUMNUS*
27 species

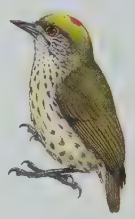


*P. albosquamatus*
White-wedged Piculet

Subfamily **PICINAE (1 OF 2)**

Tribe **Nesoctitini**

*NESOCTITES*
1 species



*N. micromegas*
Antillean Piculet

Tribe **Hemicircini**

*HEMICIRCUS*
3 species



*H. concretus*
Red-crested Woodpecker

Tribe **Campephilini**

*CAMPEPHILUS*
12 species



*C. guatemalensis*
Pale-billed Woodpecker

*BLYTHIPICUS*
2 species



*B. pyrrhotis*
Bay Woodpecker

*CHRYSOCOLAPTES*
9 species



*C. guttacristatus*
Greater Flameback

## Subfamily **Picinae (2 of 2)**

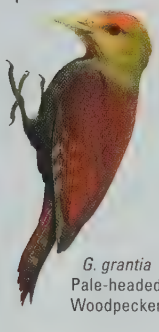
### Tribe **Picini**

*Dinopium*
6 species



*D. benghalense*
Black-rumped Flameback

*Gecinulus*
2 species



*G. grantia*
Pale-headed Woodpecker

*Micropternus*
1 species



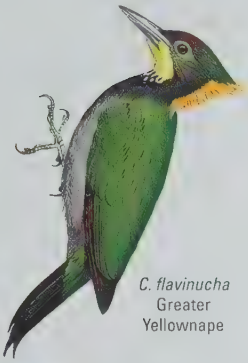
*M. brachyurus*
Rufous Woodpecker

*Meiglyptes*
4 species



*M. grammithorax*
Buff-rumped Woodpecker

*Chrysophlegma*
4 species



*C. flavinucha*
Greater Yellownape

*Geocolaptes*
1 species



*G. olivaceus*
Ground Woodpecker

*Campethera*
13 species



*C. punctuligera*
Fine-spotted Woodpecker

*Picus*
15 species



*P. squamatus*
Scaly-bellied Woodpecker

*Piculus*
7 species



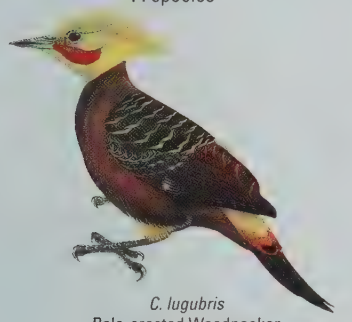
*P. chrysochloros*
Golden-green Woodpecker

*Colaptes*
19 species



*C. auratus*
Yellow-shafted Flicker

*Celeus*
14 species



*C. lugubris*
Pale-crested Woodpecker

*Hylatomus*
5 species



*H. lineatus*
Lineated Woodpecker

*Mulleripicus*
4 species



*M. pulverulentus*
Great Slaty Woodpecker

*Dryocopus*
3 species



*D. martius*
Black Woodpecker

### Tribe **Melanerpini**

*Sphyrapicus*
4 species



*S. nuchalis*
Red-naped Sapsucker

*Xiphidiopicus*
1 species



*X. percussus*
Cuban Green Woodpecker

*Melanerpes*
23 species



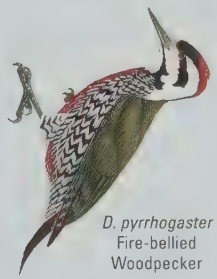
*M. superciliaris*
West Indian Woodpecker

*Picoides*
10 species



*P. tridactylus*
Three-toed Woodpecker

*Dendropicos*
17 species



*D. pyrrhogaster*
Fire-bellied Woodpecker

*Leiopicus*
3 species



*L. mahrattensis*
Yellow-crowned Woodpecker

*Dryobates*
6 species



*D. pubescens*
Downy Woodpecker

*Leuconotopicus*
6 species



*L. albolarvatus*
White-headed Woodpecker

*Veniliornis*
14 species



*V. affinis*
Red-stained Woodpecker

*Dendrocopos*
13 species



*D. major*
Great Spotted Woodpecker

# Order: CARIAMIFORMES

## CARIAMIDAE
Seriemas

2 genera • 2 species

Related Families Falconidae (falcons and caracaras), Psittaciformes (3 families), Passeriformes (137 families)

Similar Birds Secretarybird (Sagittariidae), bustards (Otididae),

Description
- Plumage soft, loose, colored in streaky and barred grays and browns
- Wings medium length, rounded; tail long
- Body medium-large, elongate ovoid, with horizontal to upright carriage
- Bill short, deep, slightly decurved, bright red in *Cariama*
- Head small; crest on forehead and blue facial skin in *Cariama*; neck long with long loose feathers
- Legs long; toes short, slightly webbed at bases
- Sexes similar

Habitat Seriemas live in open habitats in South America, from open woodlands to savannas and grasslands.

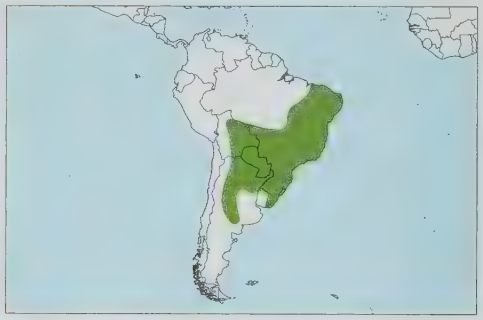
Food Seriemas eat primarily insects, mainly grasshoppers and beetles; fruit, seeds, leafy matter, and other plant material, as well as small vertebrates, including snakes, lizards, and rodents, are taken in smaller quantities.

Breeding Seriemas are monogamous with biparental care. They build their nest atop a low tree. The nest is loosely constructed of sticks, lined with leaves and clay and placed such that the parents birds do not have to fly to reach it. The typical clutch size for seriemas is 2 eggs, with a range of 1 to 3. Both parents assist in the construction of the nest, and the female incubates solo, or nearly so, for about a month before the eggs hatch. The chicks hatch with light brown down, and both parents provision the young, with food ranging from worms to snakes. The chicks jump down to the ground to accompany the parents at a couple weeks of age. There they continue to grow until independence, which may occur as early as a month post-hatch, though they do not appear to attain full adult size until about four or five months of age.



Red-legged Seriema, *Cariama cristata*. Aroe Jari, near Chapada dos Guimaraes NP, Matto Grosso, Brazil. © D. W. Winkler.





Although they walk like cranes, these long-legged birds of sparsely wooded South American grasslands more resemble the Secretarybird. Both have eyelash-like feathers, but seriemas lack the Secretarybird's long plumes on the nape. One species instead sports a distinctive fountain of long movable feathers between bill and eyes. These, along with many of the feathers of the head and neck, can be ruffled or smoothed into communicative facial expressions. Where not persecuted, seriemas can be quite tame, seemingly feeding on cereal and table scraps as happily as on their more-usual small animal fare. A long-legged bird in its stick-nest on a small shrubby tree always attracts attention, more so when this bird's far-carrying cries are heard.

Conservation There are no immediate conservation concerns for either species of seriema.

Relationships The two seriema species are the



Red-legged Seriema, *Cariama cristata*. Cuiabá, Brazil. © B. G. Thomson.

only representatives of their family (Cariamidae) and order (Cariamiformes). Until recently the seriemas were generally considered to be part of Gruiformes, possibly closest to cranes (Gruidae), trumpeters (Psophiidae), or, most commonly, bustards (Otididae). Recent molecular studies have instead shown that the seriemas are not closely allied with any of these other traditional gruiform families, and are instead part of a large clade of higher landbirds (Ericson *et al.* 2006a). Within that group, Cariamiformes may be sister to Falconiformes with these two together in turn sister to the remaining higher landbirds, Psittaciformes plus Passeriformes (Wang *et al.* 2012). Alternatively, and a little better supported, is the hypothesis that Cariamiformes is the first of a series of orders in a an unbalanced, ladderized phylogeny, with Cariamiformes sister to the enormous clade that includes Falconiformes, Psittaciformes, and Passeriformes (Hackett *et al.* 2008, Jarvis *et al.* 2014).



Red-legged Seriema, *Cariama cristata*. Aroe Jari, near Chapada dos Guimaraes NP, Matto Grosso, Brazil. © D. W. Winkler.



# Order: FALCONIFORMES

## FALCONIDAE
Falcons and Caracaras

11 genera • 64 species

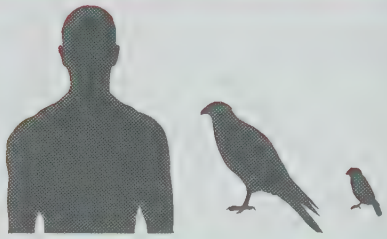
**Related Families** Psittaciformes (3 families), all Passeriformes (137 families)

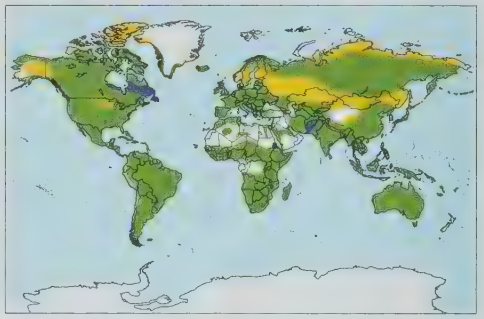
**Similar Birds** Hawks (Accipitridae), Osprey (Pandionidae)

**Description**
- Falcon plumage typically earth-toned above, lighter and streaked below; caracaras typically black and white
- Wings long, pointed in open-country falcons, broader and rounded in caracaras and forest falcons; tail long, narrower in falcons
- Body tiny to medium in size, ovoid, more compact in falcons
- Bill short, hooked, with tomial tooth in falcons
- Head elongate in caracaras; neck thick, short in falcons, medium in caracaras; colored cere and bare facial or throat skin, especially in caracaras
- Legs medium length in caracaras and short in falcons; toes long and robust in falcons and shorter in caracaras, claws stout, hooked
- Sexes similar; females larger than males



Chimango Caracara, *Phalcoboenus chimango*. Buenos Aires, Argentina. © Ramón Casares.





**Habitat** Falconids live most commonly in open habitats, from Arctic and alpine tundra to grasslands and shores; however, quite a few species, especially those in the subfamily Herpetotherinae, occupy dense forest.

**Food** The diets of falcons and caracaras vary tremendously. Most falcons are strictly carnivorous, with some specializing on a single prey group (e.g., snakes in *Herpertotheres*). Many of the smaller species take primarily insects but will shift to small mammals and birds when feeding their nestlings. Most larger falcons take birds, usually while flying. Caracaras are more generalized, with many species taking a mixed diet of animals, both dead and alive, as well as grain and fruit. They, too, have species with interesting diet specializations (e.g., wasp adults and larvae in *Ibycter*).

**Breeding** Most falconids are monogamous with biparental care, and, while most falcons nest in solitary pairs, there are some species that nest in large colonies, such as the Red-footed Falcon *Falco vespertinus* and Lesser Kestrel *F. naumanni*. Cooperative breeding occurs at least in *Ibycter* and perhaps in other caracaras. Falcons use a variety of nest sites. Some, like the forest

From the sleek lightning-fast falcons to the more harrier-like caracaras, this family seems at first sight an unnatural group. Nonetheless, these birds are united anatomically, and their DNA makes clear that these diurnal raptors are not closely related to the other hawks and eagles. Falcons specialize on a wide array of animal prey, from grasshoppers and voles to bats and flying birds, whereas caracaras range from generalist predation on a variety of terrestrial animals to narrow specialization on wasp nests. Virtually all the core falcons have a tomial "tooth," which is actually a notch in the cutting edge of the upper bill, and many of the forest falcons have bare facial skin, as do almost all caracaras.



Peregrine Falcon, *Falco peregrinus*. Manjoor, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.

falcons and many smaller *Falco* kestrels, nest in abandoned tree cavities. Most larger falcons do not construct a nest, and instead use a cliff ledge or the unoccupied nests of other species, such as ravens, hawks, and owls. Most caracaras build their own stick nest lined with wool, dung, etc. Falconids lay 1 to 6 eggs, with 2 or 3 being the most common clutch sizes. The relatively large eggs are incubated for four to five weeks before hatching. In falcons, the female does the bulk of incubation, though both sexes participate in all aspects of parental care. The chicks hatch almost synchronously, with eyes closed but wearing a thin coat of down. The male does most of the foraging for the family, bringing food to the female at the nest, who broods the young until they are about a week to ten days old and partitions food to the nestlings, tearing bits of prey for the chicks to eat until they are strong enough to do it themselves. The chicks fledge after about a month to seven weeks in the nest (longer periods for larger birds), and the different species are quite variable in how long they stay in the nest vicinity after fledging, from a couple weeks to many months, depending to a great extent on the migratory habits of the species.

**Conservation** Falconids, generally being birds of open country, may be a little better off than other families of land birds, but 15 species (23%) are of conservation concern (9 NT, 4 VU, 2 EN). The Peregrine Falcon *F. peregrinus* experienced precipitous declines, but removal of bioaccumulating pesticides from the environment and captive breeding programs have restored its populations. Several endemics to islands in the Indian Ocean have small populations that make them vulnerable: *F. buboisi* went extinct on Reunion Island very soon after human contact, and *F. punctuatus* is endangered on Mauritius and *F. araeus* is vulnerable in the Seychelles. Another small-island endemic, *Caracara lutosa*, went extinct on Guadalupe off the coast of Mexico by 1900 as a direct result of human persecution. Even the widespread Saker Falcon *F. cherrug* is endangered, perhaps because the birds are taken from the wild for falconry.

**Relationships** Falconidae has traditionally been grouped with other families of diurnal birds of prey, including Accipitridae and Cathartidae (Cracraft 1981, Sibley & Ahlquist 1990, Livezey & Zusi 2001, Dickinson 2003, Clements 2007). Earlier morphological analyses (Jollie 1977) suggested, however, that Falconidae may actually be closer to the parrots, owls, cuckoos, or turacos, and recent molecular work supports this interpretation: Falconidae does not cluster with the other diurnal raptors, and instead appears most likely to be part of a ladderized phylogeny, branching between Cariamidae and Psittacidae (Ericson *et al.* 2006a, Hackett *et al.* 2008, Suh *et al.* 2011, Jarvis *et al.* 2014). This makes Falconidae sister to the enormous clade that includes Psittaciformes and Passeriformes. A similar interpretation places Falconidae sister to Cariamidae, which taken together are sister to Psittacidae plus Passeriformes (Wang *et al.* 2012). Within Falconidae, the *Micrastur* forest-falcons and Laughing Falcon (*Herpetotheres*) form a clade that is sister to the other falcons and caracaras. The caracaras form a well-differentiated clade, which is in turn sister to the remaining falcons in the genera *Falco*, *Microhierax*, and *Polihierax*. It appears that the Spot-winged Falconet (*Spiziapteryx*) of Argentina is actually a caracara and sister to all the rest in that clade (Griffiths *et al.* 2004).



Banded Kestrel, *Falco zoniventris*. Ifaty, Madagascar. © Nick Athanas.



Lesser Kestrel, *Falco naumanni*. Silivri, Istanbul, Turkey. © Murat Cuhadaroglu.

## Subfamily **HERPETOTHERINAE**

*HERPETOTHERES*
1 species



*H. cachinnans*
Laughing Falcon

*MICRASTUR*
7 species



*M. ruficollis*
Barred Forest-falcon

## Subfamily **FALCONINAE**

### Tribe **Polyborini**

*SPIZIAPTERYX*
1 species



*S. circumcincta*
Spot-winged Falconet

*CARACARA*
2 species



*C. cheriway*
Crested Caracara

*IBYCTER*
1 species



*I. americanus*
Red-throated Caracara

*PHALCOBOENUS*
5 species



*P. megalopterus*
Mountain Caracara

*MILVAGO*
1 species



*M. chimachima*
Yellow-headed Caracara

*DAPTRIUS*
1 species



*D. ater*
Black Caracara

### Tribe **Falconini**

*MICROHIERAX*
5 species



*M. caerulescens*
Collared Falconet

*POLIHIERAX*
2 species



*P. semitorquatus*
African Pygmy-falcon

*FALCO*
38 species



*F. rufigularis*
Bat Falcon

# Order: PSITTACIFORMES

## Families: Strigopidae, Cacatuidae, Psittacidae

Although Psittaciformes has been stable at the order level, the relationships of the groups that make up this large order have not been. In addition, the placement of the parrots within the larger avian tree has been difficult to resolve. Cracraft (1981) discussed the possible close relationships with the pigeons (Columbidae) and the cuckoos (Cuculidae), but was unable to place them with any certainty. Livezey and Zusi (2001, 2007) placed the parrots near the pigeons or near Coraciiformes. Even with recent genetic data, the exact relationships of the parrots remain unsettled.

Both Hackett *et al.* (2008) and Jarvis *et al.* (2014) found that the parrots are part of a higher landbird clade that includes Accipitriformes, Strigiformes, Coraciiformes, Bucerotiformes, Leptosomiformes, Trogoniformes, Coliiformes, and Passeriformes. Within this large and diverse radiation, Psittaciformes appears to be sister to Passeriformes. These two groups taken together are in turn sister to Falconiformes (Suh *et al.* 2011) or to the combined clade of Falconiformes and Cariamiformes (Wang *et al.* 2012).

One, two, or three families within Psittaciformes have traditionally been recognized. In the past, family boundaries have sometimes been drawn with three separate families: cockatoos, lories, and all the rest of the parrots (Christidis *et al.* 1991). Alternatively, all parrots and cockatoos have all been lumped into a single family, Psittacidae (Dickinson 2003, Gill *et al.* 2009). Recent genetic data have shown that there are three distinct, well-supported clades in Psittaciformes, though their membership is different than previously proposed. Cacatuidae is sister to Psittacidae, which includes the lories (de Kloet & de Kloet 2005, Hackett *et al.* 2008, Wright *et al.* 2008). The two New Zealand endemic genera (*Nestor* and *Strigops*) constitute the third distinct clade within the Psittaciformes. They are here recognized as Strigopidae, and recent DNA sequence data have shown this clade to be at the base of Psittaciformes, sister to both Cacatuidae and Psittacidae (de Kloet & de Kloet 2005, Tavares *et al.* 2006, Wright *et al.* 2008, Joseph *et al.* 2012).



Crimson Rosella, *Platycercus elegans*. Basin View, New South Wales, Australia. © Graeme Chapman.

Psittaciformes

# STRIGOPIDAE
## New Zealand Parrots

2 genera • 3 species

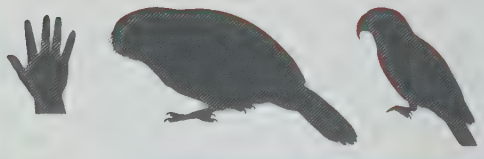
Related Families Cacatuidae (cockatoos), Psittacidae (parrots)

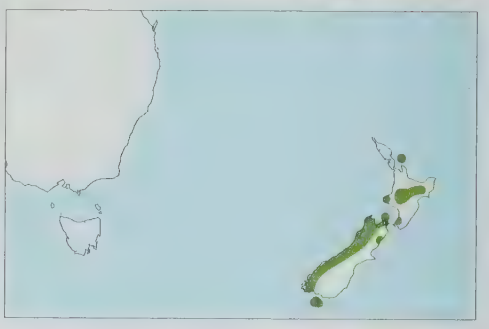
Similar Birds Parrots (Psittacidae), cockatoos (Cacatuidae)

Description
- Plumage earth-toned, largely brown or green
- Wings medium-long and broad in *Nestor*, short and weak in flightless *Strigops*; tail medium length, rounded
- Body medium-sized, ovoid, stout
- Bill long, strongly curved in *Nestor*, with particularly long maxilla; bill smaller in *Strigops*, with filamentous, sensitive whisker-like bristles in face
- Head medium to large; neck short, thick
- Legs and toes fairly short, longer and stouter in terrestrial *Strigops*; feet zygodactyl
- Sexes generally similar; bill in female *Nestor* shorter and less curved than in male; female *Strigops* smaller than male



Kea, *Nestor notabilis*.
Doubtful Sound, Fiordland, New Zealand. © G. B. Baker.





Habitat All three species occupy native forests, with the Kea *Nestor notablis* preferring higher elevations in the South Island. *Strigops* is now limited to offshore islands protected from introduced terrestrial predators.

Food *Nestor* species, like most other parrots, eat a wide variety of fruits, seeds, nuts, invertebrates, and, occasionally, meat from carcasses. The larger bills of males appear to give them greater access to wood-living grubs and some large hard nuts. The Kea is probably the most important disperser of fruit seeds in the alpine region of New Zealand. The Kaka *N. meridionalis* depends a great deal on honeydew from scale insects during the breeding season. *Strigops* is strictly vegetarian, taking a wide variety of leaves, fruit, seeds, and nuts, and, unlike other birds, grinding its food in its mouth rather than its gizzard. Like other vegetarian birds, it appears to have a foregut bacterial flora that aids digestion, and its breeding seasons are dictated by the irregular mast-fruiting of key fruiting species.

Breeding Strigopids are unusual among psittaciforms for the flexibility of their mating systems. The Kaka appear to be monogamous, the Kea polygynous or monogamous, and the Kakapo lek-mating polygynous with no pair bond. All strigopids nest in burrows, crevices, and hollows, most near the ground, but the

These three New Zealand endemics all bear Maori common names. Populations of the Kaka and the Kakapo are hanging on in protected remnants of once-widespread ranges on both the North and South Islands. Their shared peril may be their most obvious similarity: A smart and opportunistic pirate, the gregarious and garrulous Kaka is at home in the canopy. The Kakapo is flightless, though it is a decent jogger and an agile climber. Largely nocturnal, the Kakapo has a lek mating system based on low-frequency booming displays. The third species, the Kea, has thrived until recently in its alpine habitat. One of the most intelligent birds, this inquisitive mischief-maker is now studied for its innovative tool use and problem-solving ability.



New Zealand Kaka, *Nestor meridionalis*. Little Barrier Island, New Zealand. © D. W. Winkler.



Kakapo, *Strigops habroptilus*. Codfish Island, New Zealand. © Simon Fordham / NaturePix.

Kaka's nests are often quite high up in tree cavities or artificial nest boxes. Strigopids lay 1 to 5 eggs, with 4 the typical clutch size for *Nestor* species and 2 the most common for *Strigops*. Female *Strigops* do all parental care, but in *Nestor*, males feed the females while they are incubating, and they feed the chicks, via the females, during the nestling phase, but they appear to take a larger role feeding and attending the young once they've fledged. Incubation in *Strigops* takes about a month, and the downy chicks take about three months before they leave the nest, still attended by the female for months after fledging. In *Nestor*, incubation takes about three weeks, and the nestlings fledge at about 70 to 90 days post-hatch.

**Conservation** All of these birds have suffered tremendously from the introduction of rats, stoats, and cats to an ecosystem that formerly lacked any terrestrial predators, and all three are at risk (1 VU, 1 EN, 1 CR); an endemic *Nestor* species on Norfolk Island went extinct soon after European contact in the 19th century. The Kakapo is critically endangered, with a 2014 population size of 126 individuals up from its nadir of 65 in the mid 1990's. At that time, all wild Kakapo were transferred onto four offshore, predator-free islands, and an intensive program of captive breeding and monitoring was initiated. The Kaka is endangered and persists on predator-free offshore islands and a few mainland sites where terrestrial mammalian predators are controlled or were eliminated; it suffers as well from competition with introduced bees, wasps, and marsupials for honeydew from scale insects. The Kea is considered only vulnerable, yet it appears to be declining over much of its range.

**Relationships** These New Zealand parrots were traditionally placed in the larger parrot family Psittacidae, but recent molecular studies show that Strigopidae is sister to a clade formed by Cacatuidae and Psittacidae (de Kloet & de Kloet 2005, Tavares *et al.* 2006, Wright *et al.* 2008, Joseph *et al.* 2012). Relationships in this small family are well resolved: the Kakapo is sister to the two *Nestor* species (de Kloet & de Kloet 2005, Tavares *et al.* 2006, Wright *et al.* 2008).

Subfamily **STRIGOPINAE**

*STRIGOPS*
1 species



*S. habroptila*
Kakapo

Subfamily **NESTORINAE**

*NESTOR*
2 species



*N. meridionalis*
New Zealand Kaka

Psittaciformes

## CACATUIDAE
Cockatoos

7 genera · 21 species

Related Families Psittacidae (parrots)

Similar Birds Parrots (Psittacidae), New Zealand parrots (Strigopidae)

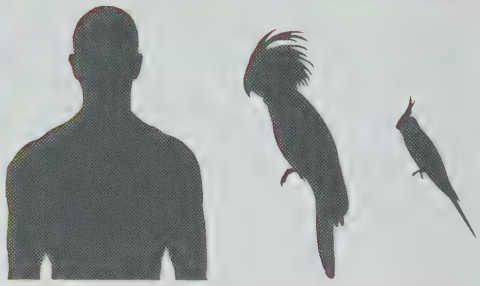
Description
- Plumage dominated by white, gray, or black, often with small patches of contrasting primary colors
- Wings medium to long, broad, and rounded; tail medium to long
- Body small to medium, generally ovoid and stout, more elongate in a few species
- Bill short, very deep, and hooked; upper bill uncommonly mobile relative to skull
- Head small to large, most with distinct (often colorful) crest or long feathers on crown; neck short, thick
- Legs and toes short, thick; feet zygodactyl
- Sexes similar; slight plumage dimorphism in some species

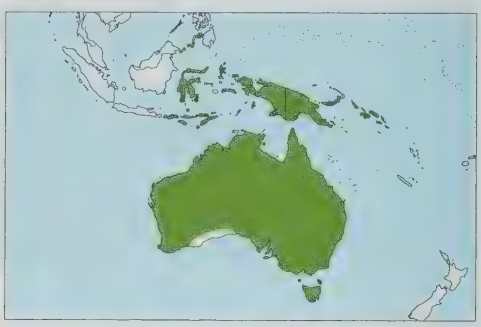
Habitat Cacatuids live in a wide variety of habitats, from low-elevation tropical rainforest, arid scrubland, and desert to high-elevation mountain forests. Many species are comfortable in highly human-altered habitats.

Food During most of the year, cockatoos feed mainly on seeds, nuts, and fruits, though there is a degree of specialization among species. For instance, many species of cockatoos feed on insects, especially while breeding and when feeding nestlings. Within some species, different bill types confer specialization on different types of seeds and nuts: birds with larger and heavier bills feed on larger and stronger-hulled nuts. Some species, such as the Galah and Cockatiel, form huge flocks as they forage in search of seeds and grain, sometimes becoming agricultural pests.



Red-tailed Black-cockatoo, *Calyptorhynchus banksii*. Cairns, Queensland, Australia. © B. G. Thomson.





Breeding Cockatoos are monogamous with biparental care. They nest in cavities and hollows in trees that they do not excavate, though many species line the bottom of the nest chamber with woodchips. Palm Cockatoos (*Probosciger*) are unique in building a nest platform of sticks in the nest chamber. Clutch size varies from 1 to 8, with larger clutches in the species that are smaller and live in more seasonal environments. Females alone incubate in *Calyptorhynchus*, but both sexes incubate in the rest. Asynchronous hatching of the young leads to staggered fledging for chicks in many cacatuid broods. Incubation takes 19 to 29 days, and nestling periods

Cockatoos are large parrots of Australo-Papua, almost all of which sport distinctive crests. Some of the most divergent species, the Cockatiel, Galah, and Palm and Sulphur-crested Cockatoos, are also the most widely recognized. Cockatoos include some of the most familiar farmyard birds of the region, and a few are controlled as agricultural pests. Noisy and social, their flocks may number in the thousands when food is plentiful. This group of obligate cavity-nesters, with a distribution that extends right up to Wallace's Line, must find holes to use in regions largely devoid of woodpeckers, relying on endemic trees that readily drop and develop rotten tree holes for nesting.



Galah, *Eolophus roseicapilla*. Tara, Queensland, Australia. © B. G. Thomson.

range from about 5 weeks in *Nymphicus* to up to 13 weeks in the larger species. Post-fledging parental care is common and prolonged, as most cacatuids are quite social and gregarious outside the breeding season.

**Conservation** Seven cacatuid species (33%) are at risk (1 NT, 1 VU, 3 EN, 2 CR); all of them are species with small ranges, mostly island endemics, and all suffer from habitat alteration through forest cutting and conversion to agriculture. Many are also affected by capture for the pet trade.

**Relationships** Cacatuidae is one of three families in Psittaciformes. Previously, on the basis of morphological and genetic analyses (de Kloet & de Kloet 2005, Livezey & Zusi 2007) the cockatoos had sometimes been merged into the family Psittacidae along with most of the other parrots. Recent studies indicate, however, that Cacatuidae is sister to the rest of the parrots exclusive of the New Zealand strigopids (Ericson *et al.* 2006a, Hackett *et al.* 2008, Wright *et al.* 2008, Joseph *et al.* 2012). Within Cacatuidae, Calyptorhynchinae and Cacatuinae are sister clades, with Nymphicinae sister to both taken together (Wright *et al.* 2008, Joseph *et al.* 2012).



Tanimbar Corella, *Cacatua goffiniana*. Changi Village, Singapore. © Con Foley.

Subfamily **NYMPHICINAE**

*NYMPHICUS*
1 species



*N. hollandicus*
Cockatiel

Subfamily **CALYPTORHYNCHINAE**

*CALYPTORHYNCHUS*
2 species



*C. banksii*
Red-tailed Black Cockatoo

*ZANDA*
3 species



*Z. funerea*
Yellow-tailed Black Cockatoo

Subfamily **CACATUINAE**

Tribe **Microglossini**

*PROBOSCIGER*
1 species



*P. aterrimus*
Palm Cockatoo

Tribe **Cacatuini**

*CALLOCEPHALON*
1 species



*C. fimbriatum*
Gang-gang Cockatoo

*EOLOPHUS*
1 species



*E. roseicapilla*
Galah

*CACATUA*
12 species



*C. galerita*
Sulphur-crested Cockatoo

Psittaciformes

## PSITTACIDAE
### Parrots

79 genera • 374 species

**Related Families** Cacatuidae (cockatoos)

**Similar Birds** Cockatoos (Cacatuidae), New Zealand parrots (Strigopidae)

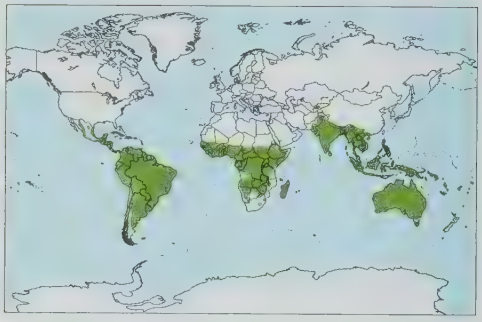
**Description**

- Plumage often brightly colored, although often quite inconspicuous against natural backgrounds; color scheme most often green with red, yellow, or blue accents
- Wings medium to long, broad, rounded; tail variable, ranging from short and square to long and pointed, even with rackets in some (*Prioniturus*)
- Body very small to medium, ovoid, elongated in some
- Bill short, deep, strongly hooked, with the upper mandible curving over the lower; upper bill uncommonly mobile relative to skull
- Head large, broad; neck short, thick
- Legs and toes short; feet zygodactyl
- Sexes generally similar; males more colorful in *Forpus* and females brighter in *Eclectus*



Rainbow Lorikeet, *Trichoglossus moluccanus*. Royal NP, New South Wales, Australia. © Drew Fulton.





**Habitat** Parrots live in a broad variety of mostly wooded habitats, from dense forest to open woodland and savanna. Although trees are essential for the majority of parrot species, which nest in cavities, some species live in open country far away from trees, where they nest in burrows or rock crevices.

**Food** Most parrots feed primarily on fruit and seeds, though lories have specialized brush-tipped tongues for feeding on nectar. In some places, such as southern Peru, large flocks of parrots gather at exposed clay banks and eat clay, a dietary addition that may serve to neutralize plant toxins that are ingested while foraging.

**Breeding** Parrots are monogamous with biparental care, and cooperative breeding is rare, with good evidence for it only in the Golden Parakeet (*Guaruba*). Almost all parrots nest in some sort of cavity, whether that be a hole in a tree, a burrow, or a termite nest. The only exceptions to this are the parakeets in the genus *Myiopsitta*, which build massive stick nests at the tops of trees and poles or on cliff ledges, with particularly large nests having several nest chambers for several pairs. Many psittacids reline pre-existing cavities, but probably the majority do a great deal of excavation in sandy soil or rotting wood. Some *Loriculus*, *Agapornis*, and *Neophema* species weave a roofed grass nest within the nest cavity. Female psittacids lay 1 to 11

As with cockatoos, the diversity of parrots reaches its apex in Australia, where a tremendous variety of types occur that have never in the family's evolutionary history occurred elsewhere. Parrots are most often green (except, of course, in Australia) and range in size from the hefty *Ara* macaws to the diminutive *Forpus* parrotlets. Most of us are most familiar with parrots as cage-bird mimics, but in nature, parrots are highly mobile, social, and loud. Their wild vocalizations are generally non-melodic squawks, lacking the sophistication one might expect given their verbal prowess in captivity. Like other psittaciforms, they use their top-hinged bills not only as a versatile feeding implement but also as a fifth limb in climbing among branches.



Yellow-eared Parrot, *Ognorhynchus icterotis*. Jardin, Colombia. © Francesco Veronesi.

eggs, with smaller clutches laid in larger species and those living in less seasonal environments. Incubation, which takes 14 to 28 days, begins with the first egg, leading to asynchronous hatching, and in most species, only the female incubates. The chicks of different species have different amounts of down at hatch, and most are brooded by the female, who is fed by the male parent, through at least the first week post-hatch. As the chicks grow and become better insulated, the female starts taking provisioning trips as well, and both parents generally feed the chicks until fledging. Parrots generally have relatively slow development, with some chicks not leaving the nest until nine weeks post-hatch, but exceptionally, nestlings of some species, such as the Ground Parrot *Pezoporus wallicus*, are able to leave the nest (though not yet fly) as soon as 18 days post-hatch. Post-fledging parental care is quite variable; some Budgerigars (*Melopsittacus*) can begin breeding on their own as early as six months after fledging, whereas many macaws are still being fed occasionally by their parents for up to a year post-fledging.

**Conservation** An alarming 160 species of psittacids (43%) are of conservation concern (59 NT, 51 VU, 36 EN, 14 CR), and these do not include the 15 species that have already gone extinct. Two of the critically endangered species typify the plights of many parrots. The Sinu Parakeet *Pyrrhura subandina* is known from a number of specimens from the Sinú Valley in Colombia, but it hasn't been reliably seen since 1949. About 98% of the available forest habitat in its range has been converted to agriculture, and recent searches for the bird have failed. Spix's Macaw *Cyanopsitta spixii* is native to a small range in east-central Brazil. Its populations were never really large, and the caraiba woodland where it lived was harvested at the same time that the birds were intensively exploited for the pet trade. There may be a handful of birds, or fewer, left in the wild, but captive breeding efforts with the 100 or so birds in captivity, together with efforts to save the few remaining patches of native woodland, give some hope.

**Relationships** Psittacidae is one of the most speciose families of all birds of the world. Within Psittaciformes, it is sister to Cacatuidae (de Kloet & de Kloet 2005, Hackett *et al.* 2008, Wright *et al.* 2008). Given the family's large number of species, it is very tempting to break it up further into smaller families (Joseph *et al.* 2012), but the exact limits of the sub-clades within this large family seem to us to be not yet clear or distinct enough to merit such a subdivision. In any event, within Psittacidae, the subfamily Psittacinae (African parrots that mostly have gray or brown in their plumage) is sister to Arinae (the enormous radiation of strictly New World parrots). These taken together appear to be sister to Psittrichasinae, which includes just one odd species from New Guinea. This group of three clades taken together appears to be sister to the other major clade of Old World parrots, which includes Platycercinae, Loriinae, Agapornithinae, and Psittaculinae. Finally, Coracopseinae, another odd clade of black parrots from Madagascar and nearby islands, appears to be sister to all the rest of the parrots (Wright *et al.* 2008). Note that Loriinae, which was often treated as a distinct family in the past, is well included in a huge Old World radiation of psittacids, and its recognition as a family would require the recognition of at least three other families.



Red-fronted Macaw, *Ara rubrogenys*. Red-fronted Macaw Reserve, Omereque, Bolivia. © Dubi Shapiro.



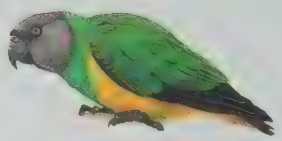
Orange-bellied Parrot, *Neophema chrysogaster*. Melaleuca, Southwest NP, Tasmania, Australia. © Drew Fulton.

PSITTACUS
2 species



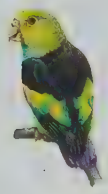
*P. erithacus*
Gray Parrot

POICEPHALUS
9 species



*P. senegalus*
Senegal Parrot

TOUIT
8 species



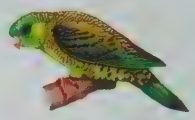
*T. batavicus*
Lilac-tailed Parrotlet

PSILOPSIAGON
2 species



*P. aurifrons*
Mountain Parakeet

BOLBORHYNCHUS
3 species



*B. lineola*
Barred Parakeet

[illegible]
[illegible] species



*[illegible] panychlora*
Tepui Parrotlet

MYIOPSITTA
2 species



*M. monachus*
Monk Parakeet

BROTOGERIS
8 species



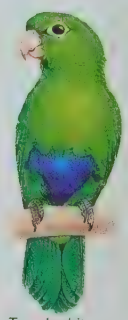
*B. versicolurus*
White-winged Parakeet

PIONOPSITTA
1 species



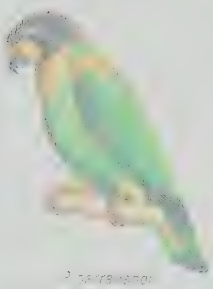
*P. pileata*
Pileated Parrot

TRICLARIA
1 species



*T. malachitacea*
Blue-bellied Parrot

PYRILIA
7 species



*[illegible]*
*[illegible]* Parrot

HAPALOPSITTACA
4 species



*H. amazonina*
Rusty-faced Parrot

PIONUS
9 species



*P. menstruus*
Blue-headed Parrot

GRAYDIDASCALUS
1 species



*G. brachyurus*
Short-tailed Parrot

ALIPIOPSITTA
1 species



*A. xanthops*
Yellow-faced Amazon

AMAZONA
34 species



*A. aestiva*
Turquoise-fronted Amazon

FORPUS
8 species



*F. conspicillatus*
Spectacled Parrotlet

PIONITES
4 species



*P. melanocephalus*
Black-headed Parrot

DEROPTYUS
1 species



*D. accipitrinus*
Red-fan Parrot

PYRRHURA
31 species



*P. picta*
Painted Parakeet

ENICOGNATHUS
2 species



*E. leptorhynchus*
Slender-billed Parakeet

CYANOLISEUS
1 species



*C. patagonus*
Burrowing Parrot

ANODORHYNCHUS
3 species



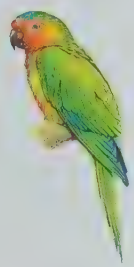
*A. hyacinthinus*
Hyacinth Macaw

RHYNCHOPSITTA
2 species



*R. pachyrhyncha*
Thick-billed Parrot

EUPSITTULA
6 species



*E. pertinax*
Brown-throated Parakeet

ARATINGA
6 species



*A. jandaya*
Jandaya Parakeet

CYANOPSITTA
1 species



*C. spixii*
Spix's Macaw

ORTHOPSITTACA
1 species



*O. manilatus*
Red-bellied Macaw

PRIMOLIUS
3 species



*P. auricollis*
Yellow-collared Macaw

ARA
8 species



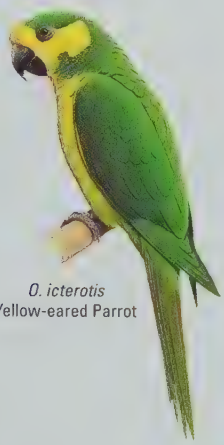
*A. macao*
Scarlet Macaw

LEPTOSITTACA
1 species



*L. branickii*
Golden-plumed Parakeet

OGNORHYNCHUS
1 species



*O. icterotis*
Yellow-eared Parrot

GUARUBA
1 species



*G. guarouba*
Golden Parakeet

DIOPSITTACA
2 species



*D. cumanensis*
Southern Red-shouldered Macaw

PSITTACARA
11 species



*P. mitratus*
Mitred Parakeet

*PSITTRICHAS*
1 species



Subfamily **CORACOPSEINAE**

*CORACOPSIS*
4 species



*C. vasa*
Vasa Parrot

*PSEPHOTUS*
1 species



*P. haematonotus*
Red-rumped Parrot

*NORTHIELLA*
1 species



*N. haematogaster*
Bluebonnet

*PSEPHOTELLUS*
3 species



*P. dissimilis*
Hooded Parrot

Subfamily **PLATYCERCINAE**
Tribe **Platycercini**

*PLATYCERCUS*
6 species



*P. elegans*
Crimson Rosella

*BARNARDIUS*
1 species



*B. zonarius*
Australian Ringneck

*LATHAMUS*
1 species



*L. discolor*
Swift Parrot

*PROSOPEIA*
3 species



*P. splendens*
Crimson Shining-parrot

*CYANORAMPHUS*
5 species



*C. novaezelandiae*
Red-fronted Parakeet

Tribe **Pezoporini**

*NEOPSEPHOTUS*
1 species



*N. bourkii*
Bourke's Parrot

*PEZOPORUS*
2 species



*P. wallicus*
Ground Parrot

*NEOPHEMA*
6 species



*N. splendida*
Scarlet-chested Parrot

Subfamily **PSITTACELLINAE**

*PSITTACELLA*
5 species



*P. picta*
Painted Tiger-parrot

Subfamily **LORIINAE (1 OF 2)**
Tribe **Loriini (1 of 2)**

*CHARMOSYNA*
15 species



*C. stellae*
Stella's Lorikeet

*VINI*
5 species



*V. kuhlii*
Rimatara Lorikeet

*PHIGYS*
1 species



*P. solitarius*
Collared Lory

*NEOPSITTACUS*
2 species



*N. musschenbroekii*
Yellow-billed Lorikeet

*GLOSSOPSITTA*
3 species



*G. concinna*
Musk Lorikeet

## Subfamily Loriinae (2 of 2)

### Tribe Loriini (2 of 2)

*Lorius*
6 species



*L. lory*
Black-capped Lory

*Chalcopsitta*
4 species



*C. atra*
Black Lory

*Pseudeos*
1 species



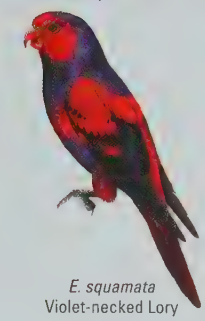
*P. fuscata*
Dusky Lory

*Psitteuteles*
3 species



*P. iris*
Iris Lorikeet

*Eos*
6 species



*E. squamata*
Violet-necked Lory

*Trichoglossus*
14 species



*T. haematodus*
Coconut Lorikeet

## Subfamily Agapornithinae

### Tribe Melopsittacini

*Melopsittacus*
1 species



*M. undulatus*
Budgerigar

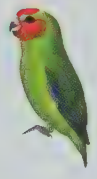
### Tribe Cyclopsittini

*Psittaculirostris*
5 species



*P. godmani*
Yellow-naped Fig-parrot

*Cyclopsitta*
6 species



*C. diophthalma*
Double-eyed Fig-parrot

*Bolbopsittacus*
1 species



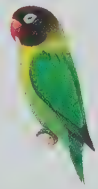
*B. lunulatus*
Guaiabero

*Loriculus*
13 species



*L. galgulus*
Blue-crowned Hanging-parrot

*Agapornis*
9 species



*A. personatus*
Yellow-collared Lovebird

## Subfamily Psittaculinae

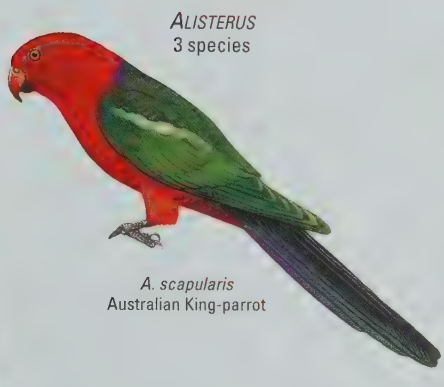
### Tribe Polytelini

*Polytelis*
3 species



*P. anthopeplus*
Regent Parrot

*Alisterus*
3 species



*A. scapularis*
Australian King-parrot

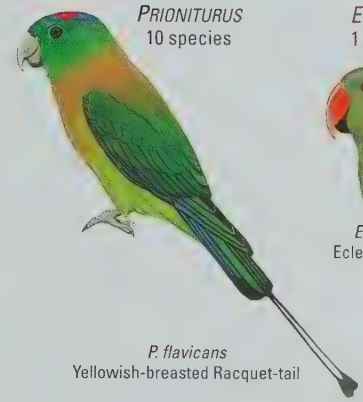
*Aprosmictus*
2 species



*A. erythropterus*
Red-winged Parrot

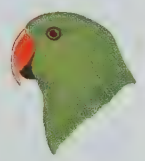
### Tribe Psittaculini

*Prioniturus*
10 species



*P. flavicans*
Yellowish-breasted Racquet-tail

*Eclectus*
1 species



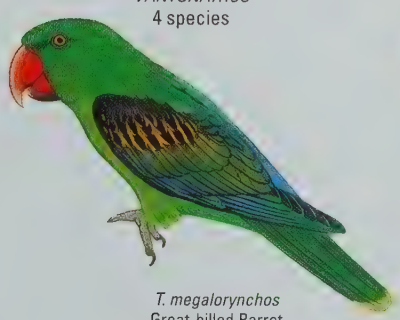
*E. roratus*
Eclectus Parrot

*Geoffroyus*
4 species



*G. geoffroyi*
Red-cheeked Parrot

*Tanygnathus*
4 species



*T. megalorynchos*
Great-billed Parrot

*Psittinus*
2 species



*P. cyanurus*
Blue-rumped Parrot

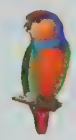
*Psittacula*
13 species



*P. eupatria*
Alexandrine Parakeet

### Tribe Micropsittini

*Micropsittia*
6 species



*M. bruijnii*
Red-breasted Pygmy-parrot

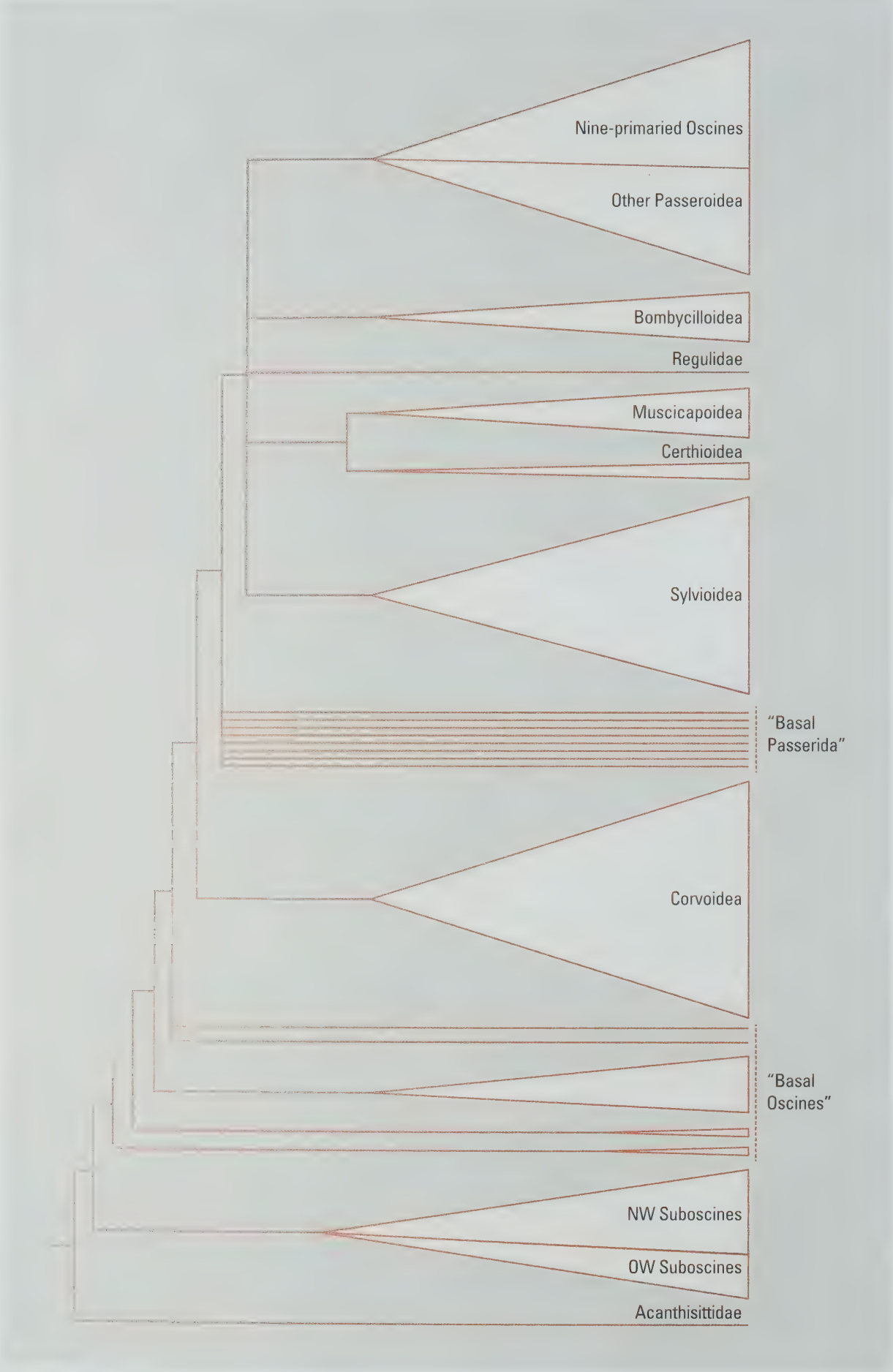



**Figure 11**. A phylogenetic hypothesis for the relationships among the major groups of passerine birds. Based on the work of Barker *et al.* (2004), Alström *et al.* (2006), Jønsson *et al.* (2011), Alström *et al.* (2013a), Barker *et al.* (2013), Aggerbeck *et al.* (2014) and Barker (2014), this tree is the provisional hypothesis that we have used to organize the groupings of passerines used in this volume.

# Order: PASSERIFORMES

The songbirds are an enormous radiation that encompasses nearly two-thirds of the world's bird species and over half the avian families. Many morphological characters, including aspects of hind limb musculature, palate structure, and foot morphology unite the passerines as an order (Raikow 1982), a hypothesis that is also supported by a wealth of genetic data. On the basis of morphological studies, Passeriformes had long been considered to be part of a large radiation of "higher landbirds" including Coraciiformes, Coliiformes, Trogoniformes, and perhaps Piciformes (Cracraft 1981, Livezey & Zusi 2001, Livezey & Zusi 2007). Cracraft (1981) also suggested that Psittaciformes were part of this radiation. While these studies were not able to convincingly identify the group with closest affinities to Passeriformes, recent molecular studies indicate pretty clearly that Psittaciformes is sister to Passeriformes. This group of two orders appears in turn to be sister to Falconiformes (Hackett *et al.* 2008, Suh *et al.* 2011, Jarvis *et al.* 2014) or to a clade made up of Falconiformes plus Cariamiformes (Wang *et al.* 2012).

Within the passerines, relationships have been more difficult to determine; the effort has been handicapped at times by the sheer diversity of the order and the difficulty of obtaining sufficiently broad and deep taxonomic sampling. Nevertheless, a great deal of concerted effort by molecular ornithologists worldwide has produced considerably clarified hypotheses of relationships in this group. Three main clades are generally recognized, Suborders Acanthisitti, Tyranni, and Passeri, which are the New Zealand wrens, suboscines, and oscines, respectively (e.g., Barker *et al.* 2004, Jønsson *et al.* 2011, Barker 2014, Cracraft 2014). All but the first of these suborders are further broken down into more manageable sub-groups, and each of these will be described as we come to them in the treatment that follows. We note that our emphasis here is on arranging the numerous families in groupings that are consistent with the phylogeny and large enough to represent a meaningful level of generality without being so large that generalizations are crippled by too many exceptions within. Some of these are informal groupings without an official taxonomic recognition, intended only as a heuristic to help the reader learn and organize the tremendous diversity of passerine birds.

Because the first suborder of passerines is represented by a single family, we start it here without a separate page leading into the group:

## Suborder: Acanthisitti

This suborder, comprising only a few species in the family Acanthisittidae (Cracraft 2014), contains the sole representatives of an ancient lineage that is sister to all other passerines (Barker *et al.* 2004, Hackett *et al.* 2008, Aggerbeck *et al.* 2014, Barker 2014).



New Zealand Rockwren, *Xenicus gilviventris*. Near Homer Tunnel, South Island, New Zealand. © Simon Fordham / NaturePix.

# ACANTHISITTIDAE

## New Zealand Wrens

2 genera • 2 species

Related Families All the rest of the Passeriformes (136 families)

Similar Birds Other wrens (Troglodytidae, Acanthizidae), small antpittas (Grallariidae), gnateaters (Conopophagidae)

Description
- Plumage: buff-brown to yellow-green on the upperparts, pale on underparts; distinct white supercilium stripe
- Wings: short, rounded; tail very short, truncate
- Body: globular ovoid, with upright posture
- Bill: short, straight, slender, pointed
- Head: large; neck short, thick
- Legs: relatively long, slender
- Sexes: generally similar; males brighter green

Habitat The two extant species of acanthisittids occupy temperate rainforest and *Nothofagus* forest and in rocky alpine and subalpine (Rockwren).

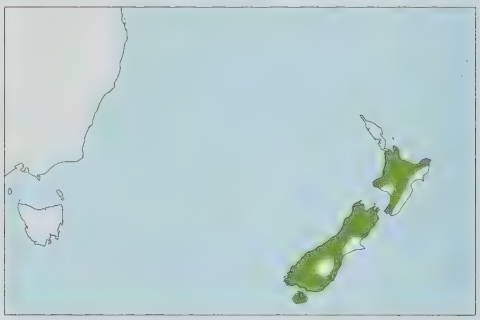
New Zealand wrens are primarily insectivorous, gleaning bark and leaf surfaces for prey while climbing tree trunks and through the canopy. Rockwrens are more open substrates, and they supplement their insect diet with fruit and nectar when insects are scarce.

Acanthisittids are monogamous with pairs that make a tight globe-shaped nest with a side entrance, placed by *Acanthisitta* in a tree hole (or nest-box) and by *Xenicus* in a crevice among roots or moss banks, or in a nest-hole excavated in a clay bank. Females typically lay 2 to 5 eggs, and the eggs, each weighing about a fifth of the female's mass, are laid every other day rather than every day as would be typical for small passerines. Both the male and female are active in nest construction, incubation, and the feeding of chicks. The male *Acanthisitta* puts a great deal of effort into the breeding attempt, constructing most of the nest, feeding the female during laying, and undertaking more trips to feed chicks once they are hatched. Cooperative breeding is common in *Acanthisitta*, but not in *Xenicus*, and helpers



New Zealand Rockwren, *Xenicus gilviventris*. Near Homer Tunnel, Fiordland NP, South Island, New Zealand. © Jon Irvine.





These tiny New Zealand endemics are built like diminutive pittas, with long, thin legs and toes, stubby tails, and compact bodies supporting large heads and slender bills. The Rifleman is a bird of forests and the Rockwren of alpine rocks and shrubs. They move with the flitting energy of kinglets, often disappearing into a crevice or tree cavity in search of insect prey. They vocalize often, with high-frequency songs and calls that are sometimes beyond the limits of human hearing. Relicts of an ancient lineage, with two of the four known species extinct since the arrival of humans to New Zealand, they serve to remind us just how much avian diversity has gone extinct.



Rifleman, *Acanthisitta chloris*. Kaikoura, South Island, New Zealand. © D. W. Winkler.

start taking a role in feeding the chicks starting about five days post-hatch. Both incubation and nestling development are slow for the birds' size: incubation takes almost three weeks, and the nestlings remain in the nest for over three weeks. Once fledged, the young continue to be fed for another month to six weeks before becoming independent.

**Conservation** Predation by introduced mammals has been the major threat to this family. Two of the four known modern species of acanthisittids have recently gone extinct. The distinctive Stephens Island Wren *Xenicus lyalli* disappeared from the single small island on which it lived within about a year after the lighthouse keeper brought cats to the island. The Bush Wren *X. longipes*, once widespread across New Zealand, succumbed to introduced predators, especially rats, and the last confirmed sighting was in the 1970's. Today, one of the remaining extant species (50%) is at similar risk (1 VU). The Rockwren *X. gilviventris* is currently restricted to small, widely scattered pockets of alpine and subalpine habitat on the South Island. These small relict populations continue to decline from heavy nest predation by introduced mammals, especially mice and stoats. A number of individuals have been transferred to predator-free islands, and predator control in remaining South Island habitat patches is also underway.

**Relationships** Acanthisittidae is an ancient lineage that is sister to all of the remaining Passeriformes. Sibley *et al.* (1982) presented DNA-DNA hybridizations suggesting that Acanthisittidae was sister to all the suboscines, and they reviewed how previous morphological studies had variously placed Acanthisittidae as closely related to Furnariidae, Pittidae, Tyrannidae, Eurylaimidae, Calyptomenidae, or all the oscine passerines. More-recent studies based on DNA sequence data provide strong support for moving Acanthisittidae even earlier in the radiation of the Passeriformes, as sister lineage to the entire passeriform radiation, including both the suboscines and oscines (Ericson *et al.* 2003b, Barker *et al.* 2004, Chesser 2004, Hackett *et al.* 2008, Aggerbeck *et al.* 2014, Barker 2014, Jarvis *et al.* 2014).



Rifleman, *Acanthisitta chloris*. Codfish Island, New Zealand. © Simon Fordham / NaturePix.



New Zealand Rockwren, *Xenicus gilviventris*. Arthur's Pass, New Zealand. © Rob Hutchinson / Birdtour Asia.

*XENICUS*
1 species

*ACANTHISITTA*
1 species



*A. chloris*
Rifleman



*X. gilviventris*
New Zealand Rockwren

# Order: Passeriformes, Old World Suboscines

## Families: Pittidae, Philepittidae, Eurylaimidae, Sapayoidae, Calyptomenidae

A large subdivision in the passerines is that between suboscines (Suborder Tyranni) and oscines. Much work has recently been done investigating the relationships within the suboscines, and the group can be divided into Old World and New World suboscines, Infraorders Eurylaimides and Tyrannides, respectively (Cracraft 2014). The Old World suboscines, including *Sapayoa*, the only New World representative of this group, form a well-supported group that includes pittas and the various broadbill and asity families (Chesser 2004, Irestedt *et al.* 2006a, Moyle *et al.* 2006a).



Long-tailed Broadbill, *Psarisomus dalhousiae*. Tingtibi, Zhemgang District, Bhutan. © Jon Irvine.

Passeriformes, Old World Suboscines

# PITTIDAE
## Pittas

3 genera • 30 species

**Related Families** Eurylaimidae (patterned broadbills, Calyptomenidae (green broadbills), Philepittidae (asities), Sapayoidae (Sapayoa)

**Similar Birds** Antpittas (Grallariidae)

**Description**
- Plumage patterned in most species with large patches of bright colors
- Wings short to medium, rounded; tail very short
- Body medium to large, ovoid, robust, with upright posture
- Bill medium-long and robust, straight
- Head large; neck short, thick
- Legs long and stout; feet syndactyl, toes long and robust with long slightly curved claws
- Sexes similar in most species, with males slightly to dramatically more brightly colored in *Hydrornis*

**Habitat** Pittas live in tropical or temperate forests, preferring habitats with extensive undergrowth and moist soil.

**Food** Pittas eat a broad variety of invertebrates, with earthworms making up a large proportion of their diet when available. Some pittas take small vertebrates (lizards and snakes), at least one coastal species takes quite a few crabs, and others take large numbers of snails.

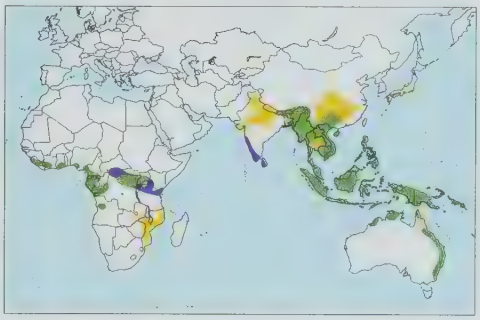
**Breeding** Pittas are monogamous with biparental care. They build relatively flimsy, loose nests of sticks, leaves, and strips of bark that are globular and usually domed, with an entrance hole in the side, though some build a cup. Nest placement varies widely even within species, with some placing their nest on the ground and others high in a tree. Females typically lay 2 to 5 eggs. Both the male and female are active in nest-building, incubation, and feeding the young. Incubation takes 14 to 18 days, and the chicks fledge after 15 to 17 days in the nest. Post-fledging parental care is very difficult to assess, but it appears to last for no more than about 10 days or so.

**Conservation** Deforestation and forest conversion are the major threats to the survival of 15 (44%) of the pitta species (7 NT, 6 VU, 2 EN). One of the endangered species is Gurney's Pitta *Hydrornis gurneyi*, now restricted to Myanmar; it probably was always a small-ranged species, but it has been dramatically affected by large-scale deforestation. The best hope for this species



Fairy Pitta, *Pitta nympha*. Koh Man Nai, Rayong, Thailand. © Alex Vargas.





Elusive jewels of Asian forests, these striking passerines are adorned in some of the purest colors of any bird, yet their shyness makes them invisible to all but the most determined, or luckiest, observer. They bound along the forest floor with a springy hop, stopping to toss bits of litter aside in search of large invertebrates, and pausing often to deliver their simple whistled or ringing calls. Many details of their lives are poorly known, but the most northern species are long-distance migrants, and some of the tropical species seem to include altitudinal migration or nomadism in their life history. In a cryptic domed nest, often on or near the ground, a dedicated pair raises their dark-downed chicks.



Black-crowned Pitta, *Erythropitta ussheri*. Tawau Hills Park, Sabah, Borneo. © Justin M. Hite.

would be the protection of large tracts of lowland forest. The other endangered species, also with a small population, is Superb Pitta *Pitta superba*, endemic to a single small island off New Guinea. This region is rich in other island-endemic pitta species and forms of the widespread *Erythropitta erythrogaster*, and changes in the taxonomic status of the latter may elevate some of these populations to the same endangered species status.

Pittas are part of the Old World radiation of suboscines. They have long been considered a distinct, monophyletic group with no close relatives among other Old World suboscines. In molecular phylogenies, Pittidae appears to be sister to all these other Old World suboscines, including Eurylaimidae, Sapayoidae, Philepittidae, and Acanthisittidae, but it is not clearly closer to any of these than to the others (Irestedt *et al.* 2002, Fjeldså *et al.* 2003, Barker *et al.* 2004, Ericson *et al.* 2006a). While they are morphologically similar to the New World Grallariidae, these groups are not closely related, and their similarity is due to convergence. Relationships within Pittidae have been investigated in two studies based on DNA sequence data (Ericson *et al.* 2006a, Moyle *et al.* 2006a), and both recognize the three genera proposed by Ericson *et al.* (2006a).



Malay Banded Pitta, *Hydrornis irena*. Sri Phang Nga NP, Thailand. © Michael Gillam.

*HYDRORNIS*
11 species

*ERYTHROPITTA*
5 species

*PITTA*
14 species



*E. erythrogaster*
Red-bellied Pitta



*H. cyaneus*
Blue Pitta



*P. brachyura*
Indian Pitta

Passeriformes, Old World Suboscines

# PHILEPITTIDAE
## Asities

2 genera • 4 species

**Related Families** Eurylaimidae (patterned broadbills)

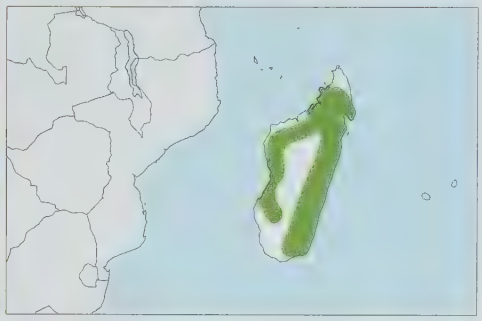
**Similar Birds** Manakins (Pipridae), sunbirds (Nectariniidae), honeycreepers (Thraupidae and Fringillidae), honeyeaters (Meliphagidae)

**Description**
- Plumage black in one, otherwise mostly yellow below and olive or iridescent blue above
- Wings rounded; tail short
- Body small, ovoid, thick
- Bill very slightly decurved in *Philepitta*, thin, long, and strongly decurved in *Neodrepanis*
- Head large; neck short, thick
- Legs short to medium; toes medium with strongly curved nails
- Males with iridescent bare facial skin; adult male *Philepitta castanea* glistening black, males of other species olive or iridescent blue above, yellow below; all females olive above and yellow below, some with streaks



Velvet Asity, *Philepitta castanea*.
Ranomafana NP, Madagascar. © Dubi Shapiro.





**Habitat** Philepittids live in the wetter forests of the eastern half of Madagascar, but with one extending west into drier deciduous forests.

**Food** *Philepitta* asities are primarily frugivorous, feeding on a wide range of understory fruits and supplementing that with nectar, particularly from mistletoe. Small fruits with high energy content are preferred. The *Neodrepanis* asities are primarily nectarivores. Both genera of asities also take a variety of insects and other invertebrates, though the chicks are apparently fed fruit.

**Breeding** The breeding biology of only the Velvet Asity *Philepitta castanea* has been studied in any depth. This species is polygynous, with males displaying at dispersed leks and mating with multiple females. The other species of asities may have similar breeding strategies, although the limited evidence suggests that some may be monogamous, with males helping to feed nestlings and fledglings. The nests of the asities are pendulous, globular, pear-shaped structures very similar to those of species in the broadbill clade, being constructed mostly of grasses, moss, bamboo leaves, twigs, and lichens. Females typically lay 2 or 3 eggs. In

All males of these endemics to Madagascar's forests share intense iridescent blue or green facial wattles. Two asity species have bills that are short but not particularly broad, and the other two (the sunbird-asities) have decurved bills recalling those of their namesakes. Not much is known of the breeding biology of this family, but the only species studied at all well appears to have a lek-polygynous mating system. Asities make a pendulous nest very similar to those of their broadbill cousins, but, distinctive among birds, they punch the entrance through the side wall of the nest after it is constructed rather than weaving in the entrance as the nest is built.



Schlegel's Asity, *Philepitta schlegeli*. Tsingy de Bemaraha NP, Madagascar. © Ken Behrens.

the Velvet Asity, nest construction, incubation, and feeding of the chicks is almost exclusively performed by the female. Field studies have observed two female-plumaged birds attending one nest; however, it is unclear whether these were indeed two females, or a female and a young male. Information on the breeding biology of the other asities is scarce, but evidence suggests that both male and female participate in nest construction and feeding chicks in the *Neodrepanis* asities.

**Conservation.** The asities are restricted to the island of Madagascar, where deforestation through logging and slash-and-burn agriculture has caused many species, including two asities [illegible] (IUCN 1 VU). The vulnerable Yellow-bellied Sunbird-Asity *Neodrepanis hypoxantha* is limited to upper montane evergreen woodland and Schlegel's Asity *Philepitta schlegeli*, considered near threatened, occupies a very scattered distribution in western Madagascar where its habitat is succumbing to mining and grazing as well as timber extraction.

**Systematics.** The asities are part of the Old World radiation of suboscines. It was generally thought that *Neodrepanis* was part of the sunbird family (Nectariniidae), until it was found that it has a suboscine morphology. Studies using morphological and genetic markers indicate that Philepittidae is sister to Eurylaimidae and is distantly related to Calyptomenidae [illegible]idae (Prum 1993, Barker *et al.* 2004, [illegible] *et al.* 2006a, Moyle *et al.* 2006a).



Yellow-bellied Sunbird-Asity, *Neodrepanis hypoxantha*. Ranomafana NP, Madagascar. © Ken Behrens.

*PHILEPITTA*
2 species



*P. schlegeli*
Schlegel's Asity

*NEODREPANIS*
2 species



*N. coruscans*
Common Sunbird-Asity

Passeriformes, Old World Suboscines

# EURYLAIMIDAE
## Patterned Broadbills

7 genera • 9 species

**Related Families** Asities (Philepittidae)

**Similar Birds** Cotingas (Cotingidae), puffbirds (Bucconidae), tityras (Tityridae)

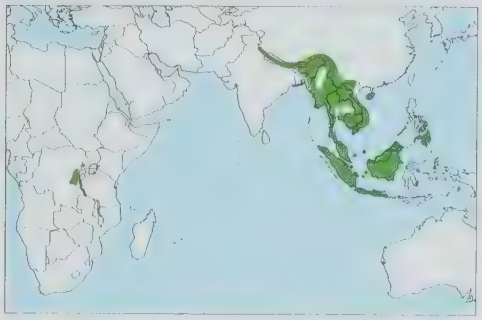
**Description**
- Plumage boldly patterned; black, brown, or wine-colored with contrasting patches of white yellow or orange
- Wings rounded; tail medium to long
- Body small to medium-sized, cylindrical ovoid, stout, with generally upright carriage
- Bill in all but *Pseudocalpytomena* broad, flat, heavy, hooked, with wide gape, and colored silver, blue, yellow, or pink
- Head large and broad; neck thick
- Legs short; toes medium, stout, syndactyl
- Sexes generally similar

**Habitat** Most eurylaimids are found in forest, although some prefer forest edges and more-open woodland habitats. Many species prefer the higher strata of forested habitats.



Black-and-red Broadbill, *Cymbirhynchus macrorhynchos*. Kaeng Krachan NP, Thailand. © Alex Vargas.





**Food** Eurylaimids feed on a broad variety of insects and invertebrates, especially large orthopterans and mantids, as well as small vertebrates (frogs, lizards, and even fish). Exceptionally, Grauer's Broadbill *Pseudocalyptomena graueri* appears to be primarily frugivorous. Most broadbills acquire food by gleaning or during short sallying flights from perches.

**Breeding** Eurylaimids appear to be monogamous with biparental care, and cooperative breeding occurs in a few species, apparently with retained young from previous attempts. The nests of all broadbills are similar, consisting of a suspended ball or bag of grass, leaves, rootlets, vine tendrils, and other plant and animal material with a thin extension dangling beneath. Female eurylaimids lay 1 to 8 eggs. Apparently, both male and female parents share in nest construction, incubation, and provisioning of the young. There appear to be no quantitative data available on the incubation and nestling periods of eurylaimids, but Banded Broadbills *Eurylaimus javanicus* have been reported feeding fledglings as much as 20 weeks after fledging.

**Conservation** Large areas of the wooded habitats of Asia have been harvested or converted

The strikingly patterned broadbills of Asia are forest canopy birds, often revealed only by their throaty staccato calls. The bold contrasting swatches of black, yellow, and red or green in their plumage often extend into a very large and brightly colored blue or silver bill, creating a visual impact to equal that of any other passerine in these forests. Their distinctive bag-like nests are suspended by a long vine or tendril far beneath overhanging branches, and often over water or near a bee or wasp nest to protect the nest from tree-bound predators. As with the green broadbills, these Asian birds have a cousin in Africa with very different appearance, but we know very little about it.



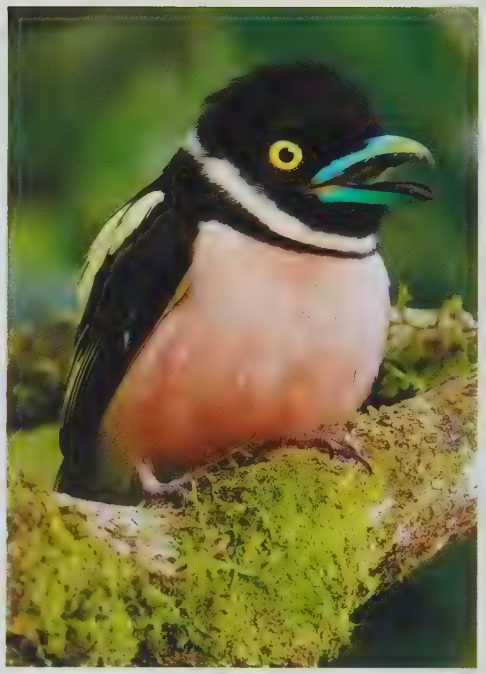
Silver-breasted Broadbill, *Serilophus lunatus*. Kaeng Krachen NP, Thailand. © Michael Gillam.

to agriculture, creating conservation concerns for four (44%) eurylaimid species (1 NT, 3 VU). The three vulnerable species occupy very restricted ranges in the Philippines or in the Albertine Rift mountains of Africa, and the near-threatened species is limited to three areas in the Malay Archipelago.

**Relationships** The eurylaimids are part of the Old World suboscine radiation of the Passeriformes. Eurylaimidae, which formerly included the green and African broadbills, and has at times included the asities, here includes only the pittas and broadbills of Asia and Grauer's Broadbill of Africa. Collectively, all the broadbills, including Sapayoidae and Philepittidae, form a well-supported clade, which is sister to Pittidae (Irestedt *et al.* 2006a, Moyle *et al.* 2006a). Both these studies also found Eurylaimidae (as defined here) to be sister to Philepittidae, and they agreed as well on relationships within this family. *Pseudocalyptomena* is sister to the remaining members of this family. The remaining species belong to two main clades, with one clade composed of the *Eurylaimus, Cymbirhynchus, Sarcophanops,* and *Serilophus* broadbills, and the second clade composed of *Psarisomus* and *Corydon* (Irestedt *et al.* 2006a, Moyle *et al.* 2006a).



Dusky Broadbill, *Corydon sumatranus*.
Danum Valley, Sabah, Borneo. © D.W. Winkler.



Black-and-yellow Broadbill, *Eurylaimus ochromalus*.
Danum Valley, Sabah, Borneo. © D.W. Winkler.

*PSEUDOCALYPTOMENA*
1 species



*P. graueri*
Grauer's Broadbill

*PSARISOMUS*
1 species



*P. dalhousiae*
Long-tailed Broadbill

*CORYDON*
1 species



*C. sumatranus*
Dusky Broadbill

*CYMBIRHYNCHUS*
1 species



*C. macrorhynchos*
Black-and-red Broadbill

*SERILOPHUS*
1 species



*S. lunatus*
Silver-breasted Broadbill

*EURYLAIMUS*
2 species



*E. ochromalus*
Black-and-yellow Broadbill

*SARCOPHANOPS*
2 species



*S. steerii*
Mindanao Wattled Broadbill

Passeriformes, Old World Suboscines

# SAPAYOIDAE
## Sapayoa

1 genus • 1 species

**Related Families** Eurylaimidae (patterned broadbills), Philepittidae (asities), Calyptomenidae (green broadbills)

**Similar Birds** Olive-colored flycatchers (Tyrannidae), female manakins (Pipridae), some female cotingas (Cotingidae), Schiffornis (Tityridae)

**Description**
- Plumage dull yellow-olive overall
- Wings and tail medium-long
- Body medium-sized, ovoid, with upright posture
- Bill broader than deep
- Head medium; neck short, thick
- Legs thick; toes short and thick
- Sexes generally similar, though males have a yellow crest

**Habitat** Sapayoas live in foothill and middle-elevation tropical rainforest, from roughly 150 to 900 m elevation.

**Food** Limited observational data suggest that Sapayoas feed primarily on insects and other arthropods, and occasionally small fruits. They sally for insects as well as glean them from leaves and branches. Sapayoas have also been observed foraging in family groups with mixed flocks of understory species (mostly furnariids and thamnophilids). Parents have been observed bringing nestlings various types of insects, including katydids, butterflies, and moths, and once a berry.

**Breeding** Sapayoas appear to be socially monogamous. The nest is similar in structure and placement to those of eurylaimids: a pear-shaped hanging nest, suspended from a branch over a stream and constructed of strips of fibrous bark. Females lay at least 2 eggs, though the full range of their clutch size remains unknown (only a few nests have been described). Both parents, and sometimes other immature birds, are active in the provisioning of the young. The role of the sexes in nest construction, incubation, or brooding needs clarification, though observations at one nest suggested that only the female brooded (Hruska *et al.* 2015).

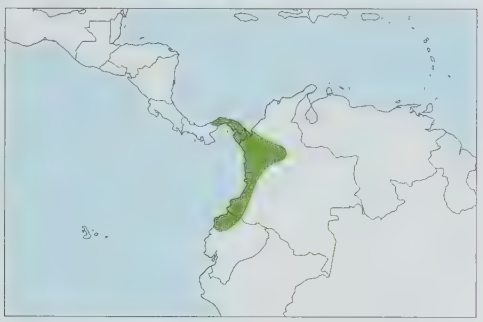


Sapayoa, *Sapayoa aenigma*. Nusagandi, Comarca de Guna Yala, Panama. © Nick Athanas.

**Conservation** Sapayoas face no immediate conservation concerns.

**Relationships** For many years, *Sapayoa* stood as a true taxonomic enigma, alternately being placed tentatively in Pipridae or Tyrannidae. Sibley and Ahlquist (1990) were the first to suggest a possible relationship with the Old World suboscines. Recent molecular phylogenetic studies have confirmed that *Sapayoa* is allied not to New World suboscines, but rather to the Old World broadbills (Fjeldså *et al.* 2003, Chesser 2004, Irestedt *et al.* 2006a, Moyle *et al.* 2006a). The affinities of Sapayoidae within this group are not yet clear: it seems to be either sister to the clade that consists of Eurylaimidae plus Philepittidae (Moyle *et al.* 2006a) or sister to Calyptomenidae (Fjeldså *et al.* 2003, Irestedt *et al.* 2006a). Based on these findings, two taxonomic treatments have been proposed. One approach would be to lump *Sapayoa* into a much more inclusive broadbill/asity family that is alone sister to Pittidae. The second, used here, is to recognize each of these distinctive groups, including *Sapayoa*, as separate families.





The enigmatic Sapayoa is the sole New World representative of the Old World suboscine radiation. This species inhabits the sub-canopy in the very wettest tropical forest, called the Chocó, which extends along the Pacific coast from Panama to northern Ecuador. The few nests found are like those of broadbills, a rough pendulous nest of fibers above a stream. This olive-green bird perches motionless on a branch, sallying out to catch large passing insects. The male sports a yellow crest that is usually concealed in the olive crown. This species' distinctive heritage has only recently been revealed by molecular analyses, and the details of its natural history are just beginning to emerge.



Sapayoa, *Sapayoa aenigma*. Nusagandi, Comarca de Guna Yala, Panama. © Nick Athanas.

*SAPAYOA*
1 species



*S. aenigma*
Sapayoa

# CALYPTOMENIDAE

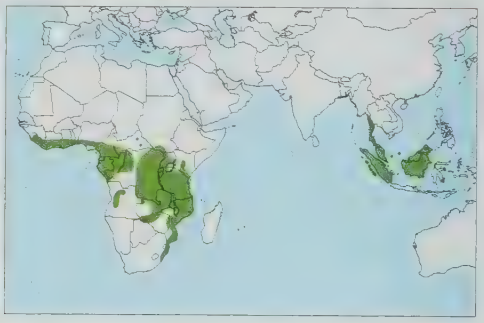
## Green and African Broadbills

2 genera · 6 species



African Broadbill, *Smithornis capensis*.
Amani Nature Reserve, Tanzania. © Nik Borrow.





These mid-sized passerines, united by their large heads, short legs, small feet, and eponymous broad bills, are of two distinct types. The green broadbills, residents of Asian forests, are known to associate closely with fruiting trees. Away from these favored foods, these birds are hard to see, their bright green plumage melding into the well-lit green of middle and upper levels of forest, and their quiet and stationary demeanor seldom giving them away. Profuse velvety forehead plumes, almost obscuring their bills, help distinguish them from their naked-billed African cousins, though the contrast goes much further: the African birds are active insectivores with dull-colored plumages that are light below and accented with streaks and patches of earth tones.



Hose's Broadbill, *Calyptomena hosii*. Poring Hot Springs, Sabah, Borneo. © James Eaton / Birdtour Asia.

primary forest in the Malay Archipelago. *C. viridis* is more widespread, but its lower-elevation habitat preferences have apparently affected it throughout its range. Although there has been less destruction of the mid-elevation forests preferred by *C. hosii* on Borneo, the species' range is so patchy and restricted that any reduction in habitat is potentially a serious threat.

**Relationships** Calyptomenids are part of the Old World suboscine radiation of the Passeriformes. Although they have long been considered to be part of a larger, more inclusive Eurylaimidae, recent molecular studies have shown that relationships are much more complex. The earliest recent study (Fjeldså *et al.* 2003) placed a clade made up of calyptomenids and *Sapayoa* as sister to the pittas, with the remaining broadbills/asities sister to this larger group. Moyle *et al.* (2006a) instead found calyptomenids to be in a polytomy with two groups: the rest of the broadbill/asity/Sapayoa group, and Pittidae. Irestedt *et al.* (2006a) suggested a resolution of this polytomy with calyptomenids sister to *Sapayoa*, these taken together sister to the rest of the broadbill/asity group, and then all these taken together sister to Pittidae. In our arrangement of families here we adopt this resolved arrangement of Irestedt *et al.* The species-level relationships of the Calyptomenidae are not yet well resolved, although all analyses suggest that its two constituent genera are each monophyletic and sister taxa (Irestedt *et al.* 2006a, Moyle *et al.* 2006a).



Green Broadbill, *Calyptomena viridis*. Sri Phang Nga NP, Thailand. © Michael Gillam.

*SMITHORNIS*
3 species



*S. rufolateralis*
Rufous-sided Broadbill

*CALYPTOMENA*
3 species



*C. whiteheadi*
Whitehead's Broadbill

# Order: Passeriformes, New World Suboscines

Families: Thamnophilidae, Conopophagidae, Melanopareiidae, Grallariidae, Rhinocryptidae, Formicariidae, Furnariidae, Pipridae, Cotingidae, Tityridae, Tyrannidae

The New World suboscines are an extremely large and diverse group of birds, and they constitute much of the exceptional diversity of birds in South America. The New World suboscines are generally divided into two groups in the parvorders Furnariida and Tyrannida (Chesser 2004, Moyle *et al.* 2009, Tello *et al.* 2009, Ohlson *et al.* 2013a, Cracraft 2014). Furnariida includes the large antbird family; the smaller families of gnateaters, crescentchests, antpittas, tapaculos, and ant-thrushes; and the most ecologically diverse of all, the ovenbirds and their allies (Moyle *et al.* 2009, Ohlson *et al.* 2013a, Cracraft 2014). Tyrannida includes the manakins, cotingas, tityras, and becards, and the largest and most diverse family of birds, Tyrannidae (Tello *et al.* 2009, Ohlson *et al.* 2013a, Cracraft 2014).



Guianan Cock-of-the-rock, *Rupicola rupicola*.
Presidente Figueiredo, Amazonas, Brazil. © Marcelo Barreiros.



White-bellied Cinclodes, *Cinclodes palliatus*. Marcapomacocha, Peru. © Luke Seitz.

Passeriformes, New World Suboscines

# THAMNOPHILIDAE
## Antbirds

59 genera • 217 species

**Related Families** Conopophagidae (gnateaters), Melanopareiidae (crescentchests)

**Similar Birds** Ant-thrushes (Formicariidae), ovenbirds (Furnariidae), vireos (Vireonidae), babblers (Timaliidae, Pellorneidae, Leiothricidae)

**Description**

- Plumage dominated by brown, gray, and black, or white and black; many species with distinct spotting on wings or barring/spotting/streaking on underparts
- Wings short to medium, rounded; tail short to long
- Body small to medium, cylindrical ovoid, with horizontal carriage
- Bill short to medium, with hooked tip
- Head medium to large; some species with distinct crest and/or brightly colored bare facial skin around eye; neck thick
- Legs medium to long; toes medium to long, with long nails
- Sexually dimorphic; males often more boldly patterned, but females often show more geographic variation



Sooty Antbird, *Hafferia fortis*.
Zancudococha, Sucumbíos, Ecuador. © Nick Athanas.

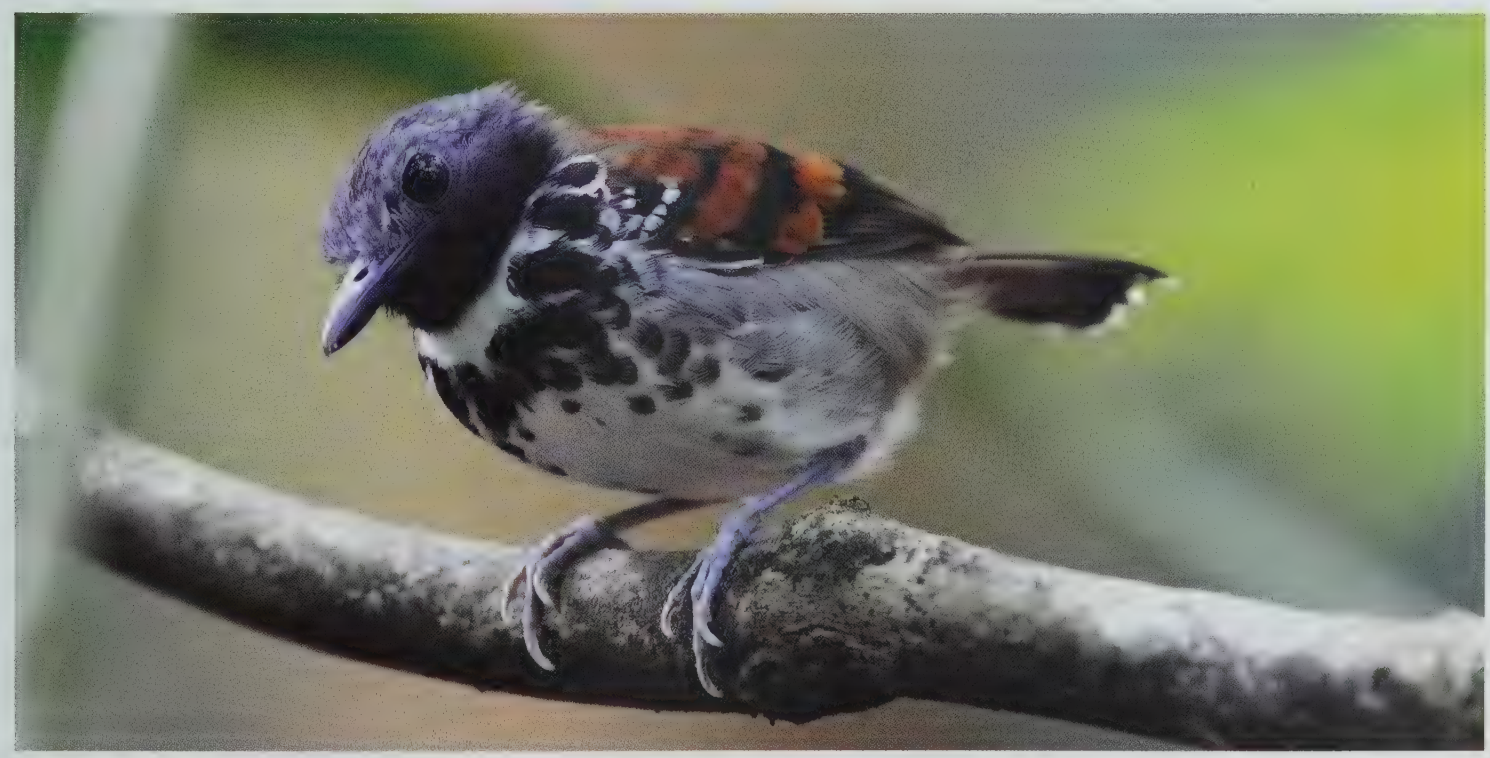




One of the very speciose families of Neotropical passerines, the antbirds are mostly understory birds with horizontal carriage and patterned plumages dominated by black, white, gray, and brown, with occasional spangles of bare colored facial skin and plumes. Some antbird species regularly follow army ant swarms, eating fleeing insects, but this is by no means true of all members of this family. Thus, the presence of "ant" in the name of a tropical New World bird species is a better indicator of relationships than diet. They most often nest in dense vegetation, but incubating birds, if disturbed, will often drop to the forest floor and perform distraction displays, with some species even flashing hidden white back feathers.

**Habitat** Antbirds live in dense tropical forests, from low-elevation rainforests to montane cloud forests, as well as in more-open habitats, including woodlands and marshes.

**Food** Antbirds primarily feed on insects and other invertebrates, utilizing a wide variety of foraging strategies that differ among species or genera. Some species get all of their food by following army ant swarms, eating the insects that are flushed up by the passing swarm. Others will occasionally follow ant swarms but more often perch-glean in the canopy for insects. Still other species, including most antwrens, do not follow ant swarms at all, instead actively gleaning insects from leaves and branches and sallying out for flying insects from exposed perches. Many antbirds are regular participants in mixed-species foraging flocks in the understory and sub-canopy; e.g., the *Thamnomanes* antshrikes are important nuclear species in Amazonian mixed flocks. Some species, such as the newly described genus *Epinecrophylla*, are highly specialized at probing suspended dead leaves for day-roosting insects and spiders. Antshrikes and some of the larger antbirds take small vertebrates, and the antshrikes also take snails and slugs. The bushbirds (*Clytoctantes* and *Neoctantes*) forage by probing and peeling bark with



Spotted Antbird, *Hylophylax naevioides*. Cerro Azul, Panama province, Ecuador. © Nick Athanas.

their thick, slightly recurved bills. Many species of thamnophilids occasionally eat some fruit.

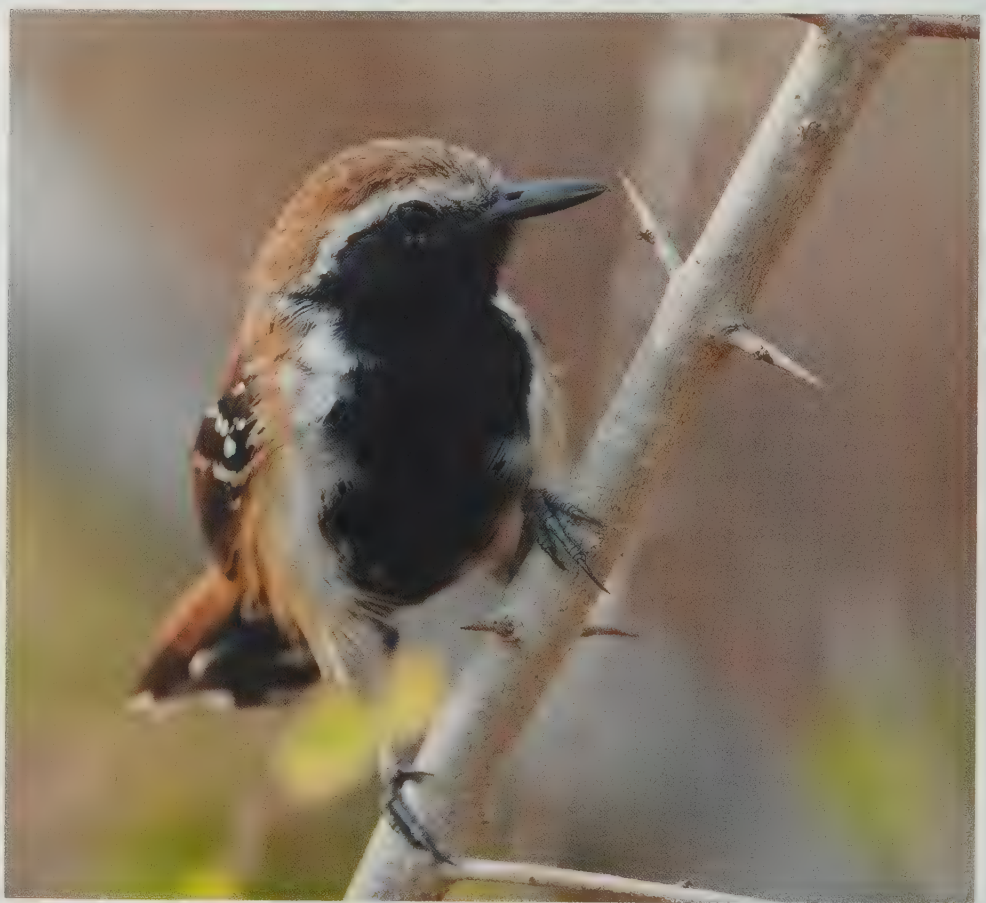
Breeding Antbirds are monogamous with biparental care. Most antbirds pair for life, and both members of the pair sing, often in loud duets that are among the most characteristic sounds of Neotropical lowland forests. Some species, such as the Ocellated Antbird *Phaenostictus mcleannani* and the Black-spotted Bareeye *Phlegopsis nigromaculata*, are cooperative breeders, with young birds, usually males, from previous breeding attempts staying to help the breeding adults raise another brood. Thamnophilid nests, made of rootlets, stems, leaves, lichens, mosses, and other plant fibers, are generally open cups, most often suspended by the rim in the fork of a tree branch, but sometimes placed atop a branch or on the ground. Those nesting on the ground often build a dome to cover the nest chamber. Females lay 1 to 3 eggs, although 2 eggs is by far the most common clutch size. Almost all antbirds appear to share parental care duties equally, with both male and female constructing the nest, incubating, and feeding nestlings and fledglings. Incubation takes 14 to 20 days, with longer periods in species with deeper (and safer?) nests. At 8 to 15 days post-hatch, the chicks leave the nest only able to flutter, and they are fed by the parents, often one chick per parent, presumably for weeks after. Young in many species remain in the parental territory until the following breeding season.

Conservation Habitat loss is the primary conservation concern for 38 (18%) of the thamnophilids (10 NT, 15 VU, 10 EN, 3 CR). The critically endangered Rio de Janeiro Antwren *Myrmotherula fluminensis* lives in the highly threatened and fragmented Atlantic Forest of Brazil, and the other two species in the category likewise have very limited ranges and small populations.

Relationships Thamnophilidae is part of parvorder Furnariida in the New World radiation of suboscine passerines (Cracraft 2014). The classification of this family has historically varied, at times grouping it into an encompassing Formicariidae together with the current Formicariidae, Grallariidae, and Conopophagidae (Skutch 1946). However, recent molecular phylogenetic studies have shown that these groups are not all closely related, and, as relationships have become better understood, breaking the distinctive monophyletic clades into separate families has become possible (Irestedt *et al.* 2001, Barker *et al.* 2004, Chesser 2004, Moyle *et al.* 2009, Ohlson *et al.* 2013a). Within the New World suboscine radiation, one recent analysis suggests that Thamnophilidae is sister to all the other families in the Furnariida (Moyle *et al.* 2009). Another recent study, however, found that the antbirds are sister to Conopophagidae (Chesser 2004, Irestedt *et al.* 2009a), which may be in a clade with Melanopareiidae, thus forming a clade of three families that is in turn sister to the rest of the Furnariida (Ohlson *et al.* 2013a). Within Thamnophilidae, the subfamilies and tribes recognized here generally follow those of Moyle *et al.* (2009) and Ohlson *et al.* (2013a). Three distinct clades are often recognized, Euchrepomidinae, Myrmornithinae, and Thamnophilinae, the last of which contains the vast majority of species in the family (Moyle *et al.* 2009, Ohlson *et al.* 2013a). As is often the case in large and diverse families, some of the most diverse traditionally recognized genera, such as *Myrmeciza* and *Myrmotherula*, were highly paraphyletic and are now split into smaller genera across Thamnophilinae (Irestedt *et al.* 2004, Moyle *et al.* 2009). New species (and even genera) of antbirds are still being discovered through careful attention to subtle geographic variation in vocalizations and female plumage.



Ferruginous-backed Antbird, *Myrmoderus ferruginea*. Near Manaus, Amazonas, Brazil. © Nick Athanas.



Rusty-backed Antwren, *Formicivora rufa*. Pousada Rio Claro, Mato Grosso, Brazil. © D. W. Winkler.

## Tribe Microrhopini

*EUCHREPOMIS*
4 species



*E. sharpei*
Yellow-rumped Antwren

*MYRMORCHILUS*
1 species



*M. strigilatus*
Stripe-backed Antbird

*APROSITORNIS*
1 species



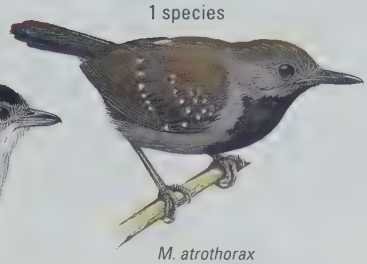
*A. disjuncta*
Yapacana Antbird

*AMMONASTES*
1 species



*A. pelzelni*
Planalto Slaty Antshrike

*MYRMOPHYLAX*
1 species



*M. atrothorax*
Black-throated Antbird

*MICRORHOPIAS*
1 species



*M. quixensis*
Dot-winged Antwren

*NEOCTANTES*
1 species



*N. niger*
Black Bushbird

*EPINECROPHYLLA*
9 species



*E. ornata*
Ornate Antwren

*CLYTOCTANTES*
2 species



*C. alixii*
Recurve-billed Bushbird

## Tribe Formicivorini

*FORMICIVORA*
10 species



*F. serrana*
Serra Antwren

*MYRMOCHANES*
1 species



*M. hemileucus*
Black-and-white Antbird

*MYRMOTHERULA*
25 species



*M. multostriata*
Amazonian Streaked Antwren

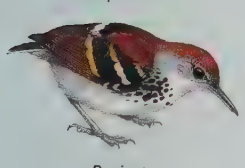
*TERENURA*
2 species



*T. maculata*
Streak-capped Antwren

## Tribe Thamnophilini (1 of 2)

*DICHROZONA*
1 species



*D. cincta*
Banded Antbird

*RHOPIAS*
1 species



*R. gularis*
Star-throated Antwren

*ISLERIA*
2 species



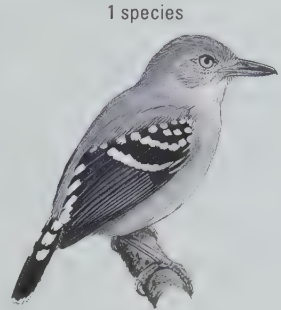
*I. guttata*
Rufous-bellied Antwren

*THAMNOMANES*
4 species



*T. ardesiacus*
Dusky-throated Antshrike

*MEGASTICTUS*
1 species



*M. margaritatus*
Pearly Antshrike

*DYSITHAMNUS*
8 species



*D. mentalis*
Plain Antvireo

*HERPSILOCHMUS*
17 species



*H. pectoralis*
Pectoral Antwren

*CYMBILAIMUS*
2 species



*C. lineatus*
Fasciated Antshrike

*TARABA*
1 species



*T. major*
Great Antshrike

## Subfamily **THAMNOPHILINAE (2 OF 2)**

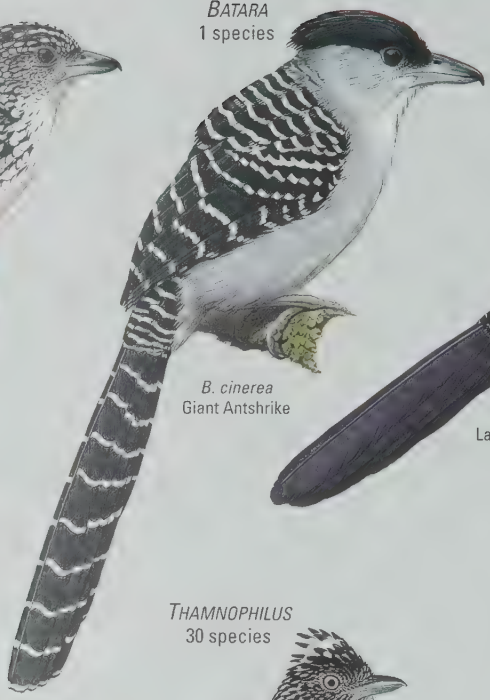
## Tribe **Thamnophilini (2 of 2)**

*HYPOEDALEUS*
1 species



*H. guttatus*
Spot-backed Antshrike

*BATARA*
1 species



*B. cinerea*
Giant Antshrike

*MACKENZIAENA*
2 species



*M. leachii*
Large-tailed Antshrike

*FREDERICKENA*
2 species



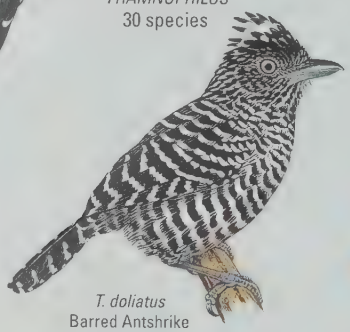
*F. viridis*
Black-throated Antshrike

*SAKESPHORUS*
3 species



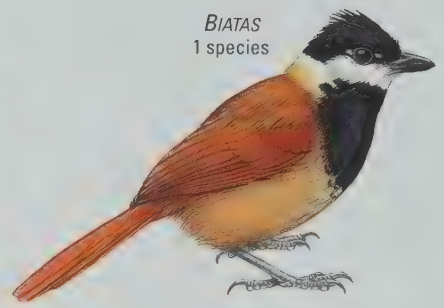
*S. canadensis*
Southeastern Antshrike

*THAMNOPHILUS*
30 species



*T. doliatus*
Barred Antshrike

*BIATAS*
1 species



*B. nigropectus*
White-bearded Antshrike

*XENORNIS*
1 species



*X. setifrons*
Speckled Antshrike

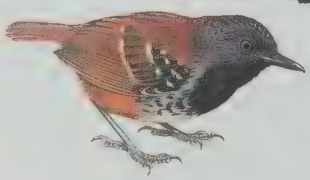
## Tribe **Pithyini**

*GYMNOCOMACRA*
1 species



*G. peruana*
Rufous Antbird

*SCIAPHYLAX*
2 species



*S. castanea*
Northern Chestnut-tailed Antbird

*DRYMOPHILA*
8 species



*D. ferruginea*
Ferruginous Antbird

*HYPOCNEMIS*
3 species



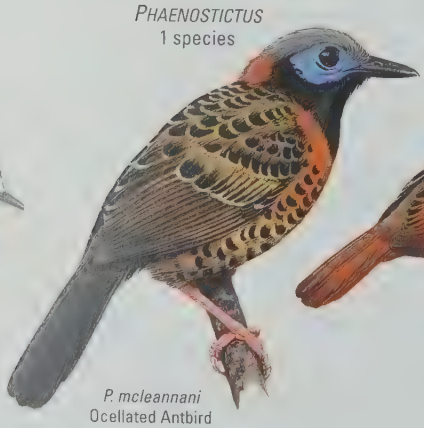
*H. cantator*
Warbling Antbird

*WILLISORNIS*
1 species



*W. poecilinotus*
Scale-backed Antbird

*PHAENOSTICTUS*
1 species



*P. mcleannani*
Ocellated Antbird

*PHLEGOPSIS*
3 species



*P. nigromaculata*
Black-spotted Bare-eye

*PITTASOMA*
2 species



*P. albidum*
White-plumed Antbird

*RHEGMATORHINA*
5 species



*R. melanosticta*
Hairy-crested Antbird

*GYMNOPITHYS*
4 species



*G. salvini*
White-throated Antbird

*Myrmoderus*
4 species



*M. ferruginea*
Ferruginous-backed Antbird

*Hylophylax*
3 species



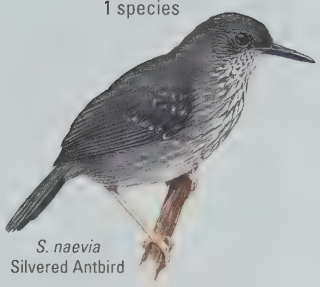
*H. naevius*
Spot-backed Antbird

*Hypocnemoides*
2 species



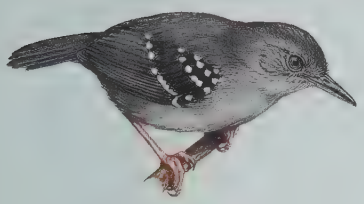
*H. maculicauda*
Band-tailed Antbird

*Sclateria*
1 species



*S. naevia*
Silvered Antbird

*Myrmelastes*
4 species



*M. leucostigma*
Spot-winged Antbird

*Poliocrania*
1 species



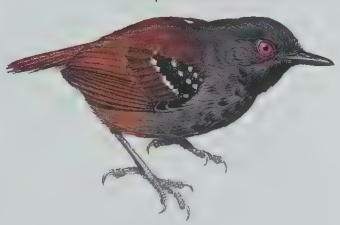
*P. exsul*
Chestnut-backed Antbird

*Ampelornis*
1 species



*A. griseiceps*
Gray-headed Antbird

*Sipia*
3 species



*S. laemosticta*
Dull-mantled Antbird

*Myrmeciza*
1 species



*M. longipes*
White-bellied Antbird

*Myrmoborus*
5 species



*M. leucophrys*
White-browed Antbird

*Gymnocichla*
1 species



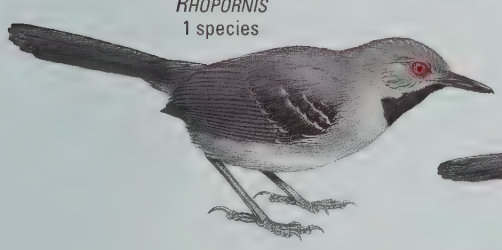
*G. nudiceps*
Bare-crowned Antbird

*Pyriglena*
3 species



*P. leuconota*
White-backed Fire-eye

*Rhopornis*
1 species



*R. ardesiacus*
Slender Antbird

*Percnostola*
2 species



*P. rufifrons*
Black-headed Antbird

*Akletos*
2 species



*A. goeldii*
Goeldi's Antbird

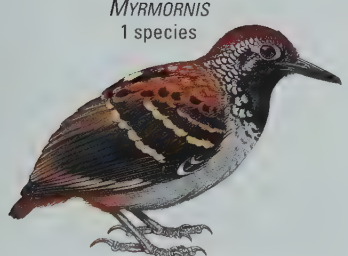
*Hafferia*
2 species



*H. immaculata*
Immaculate Antbird

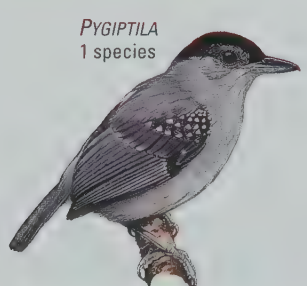
## Subfamily **Myrmornithinae**

*Myrmornis*
1 species



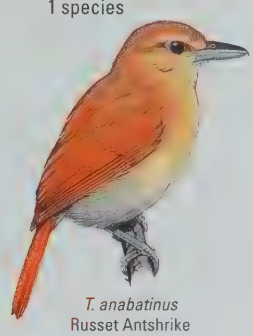
*M. torquata*
Wing-banded Antbird

*Pygiptila*
1 species



*P. stellaris*
Spot-winged Antshrike

*Thamnistes*
1 species



*T. anabatinus*
Russet Antshrike

# CONOPOPHAGIDAE

## Gnateaters

2 genera • 10 species

Related Families Thamnophilidae (antbirds), Melanopareiidae (crescentchests), Furnariidae (ovenbirds), Grallariidae (antpittas)

Similar Birds Antpittas (Grallariidae), antbirds (Thamnophilidae), babblers (Timaliidae)

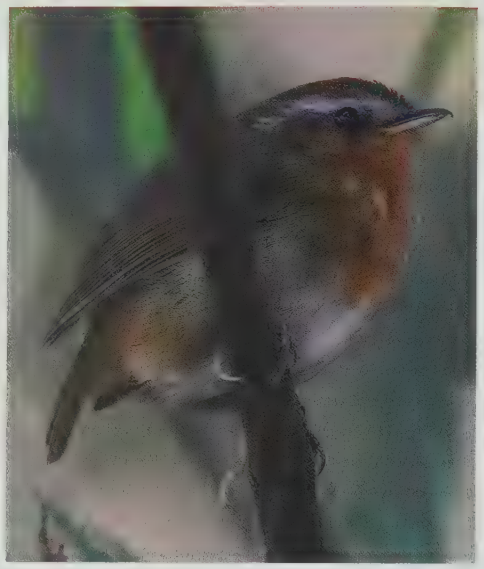
Description
- Plumage earth-toned browns, but with bold patterns of black and rich brown around the face; many have distinctive white supercilium and ear tuft, which can be expanded when agitated
- Wings short to medium, rounded; tail short
- Body small, ovoid
- Bill short, slim, with small sharp terminal hook
- Head large; neck short, thick
- Legs long; toes long with long nails
- Males more boldly patterned than females

Habitat Gnateaters live in the understory of tropical lowland and montane forests.

Food Food of conopophagids tends to be very small, less than 5 mm long, and consists almost exclusively of insects and other small vertebrates. Very occasionally gnateaters will take small fruit and small vertebrates. Gnateaters forage on and from low branches, seldom ascending more than a meter or so above the forest floor.

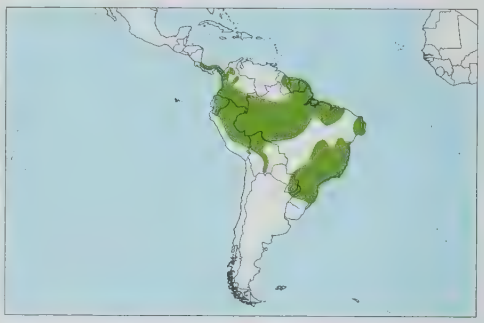
Breeding Gnateaters appear to be monogamous with biparental care. Few conopophagid nests have been described, but they are generally a cluttered mass of large leaves, rootlets, and twigs, showing a preference for blackish rootlets and lichens, suspended in fine branches or stems near the ground. Within this mass is fashioned a neat cup lined with fine rootlets. Females lay 2 eggs. Both sexes appear to participate in all aspects of parental care. The incubation period is not known for certain, but in one case was at least 12 days. The chicks stay in the nest for about 18 days, and can apparently be fed by the parents for about a month and a half after fledging.

Conservation No conopophagid species face immediate conservation concerns.



Rufous Gnateater, *Conopophaga lineata*. Near São Paulo, Brazil. © Christopher L. Wood.





Although their long legs and short tails suggest terrestrial habits, gnateaters instead spend most of their time in low branches of the forest undergrowth. They sometimes sit motionless for a minute or so, but otherwise their movements are frenetic. They dart about, flicking their wings and tails, jump to every new position on a perch, and pounce to the ground to capture prey. They may stay there only long enough to flutter up in pursuit of prey from overhanging vegetation. Most species seem to have a wide variety of calls, from single syllables to accelerating trills, with notes as varied as gutteral whistles and sibilant shrieks.



Black-cheeked Gnateater, *Conopophaga melanops*. Near São Paulo, Brazil. © Christopher L. Wood.

**Relationships** Conopophagidae is in the parvorder Furnariida of the New World suboscine radiation. Morphologically, conopophagids are like small grallariids; however, studies based on DNA sequences do not support a close affinity between them. Unfortunately, the molecular studies are really inconclusive, with some indicating closer affinities between Conopophagidae and Thamnophilidae (Chesser 2004, Ericson *et al.* 2009, Irestedt *et al.* 2009a, Ohlson *et al.* 2013a), and another (Moyle *et al.* 2009) indicating closer affinity to the clade including Furnariidae, Grallariidae, and Formicariidae. Details are still not at all clear, but Melanopareiidae also appears close to Conopophagidae in many of these studies. In any event, within the family, the *Pittasoma* antpittas, previously placed with Grallariidae, now seem clearly to belong in Conopophagidae (Moyle *et al.* 2009, Ohlson *et al.* 2013a). Relationships among the *Conopophaga* gnateaters have not yet been investigated using modern molecular phylogenetic approaches.



Chestnut-belted Gnateater, *Conopophaga aurita*. Zancudococha, Sucumbíos, Ecuador. © Nick Athanas.

*CONOPOPHAGA*
8 species



*C. melanops*
Black-cheeked Gnateater

*PITTASOMA*
2 species



*P. rufopileatum*
Rufous-crowned Antpitta

# MELANOPAREIIDAE

Crescentchests

1 genus • 4 species

**Related Families** Conopophagidae (gnateaters), Thamnophilidae (antbirds)

**Similar Birds** Wrens (Troglodytidae), ovenbirds (Furnariidae), tapaculos (Rhinocryptidae), sparrows (Passerellidae), buntings (Emberizidae)

**Description**

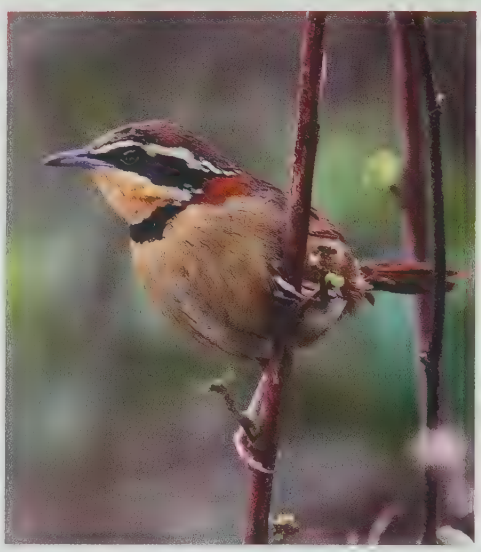
- Plumage primarily buff or brownish in color with rust-colored patches, distinctive buff supercilium, black mask across face, and black band across chest
- Wings medium-short; tail long
- Body small, cylindrical ovoid
- Bill medium length and depth, straight
- Head medium-large; neck short, thick
- Leg and feet medium-long with long claws on toes
- Sexes generally similar; males a bit more intensely colored than females

**Habitat** The crescentchests live in dense arid to semiarid scrub.

**Food** There is very little published information about what melanopareiids eat, but invertebrates are thought to make up a large proportion of their diet, with seeds taken at least occasionally.

**Breeding** Little is known of the breeding biology of the crescentchests, although what little information has been done suggests that they are monogamous with biparental care. Nest descriptions are available for only two species in this genus, and the nests in both are made of grass in a deep cup shape or side-opening globe, placed in dense shrubs or grass. Females lay 2 or 3 eggs. Observations at one nest describe a bird scolding an intruder while a second delivered fresh nesting material. The incubation period appears to be 17 to 18 days. Apparently, nothing more is known of parental care in this family.

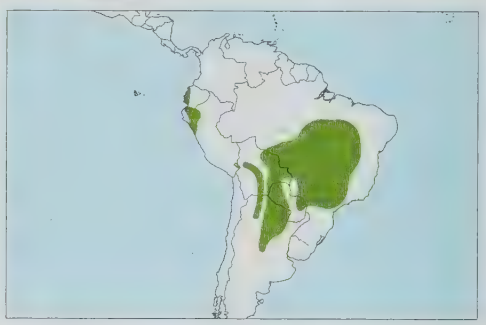
**Conservation** One of the four melanopareiid species (25%) faces immediate conservation concerns (1 NT): the Marañon Crescentchest *Melanopareia maranonica* is threatened by habitat degradation in its small, restricted range in southern Ecuador and northern Peru.



Collared Crescentchest, *Melanopareia torquata*. Serra da Canastra, Minas Gerais, Brazil. © Nick Athanas.

**Relationships** Melanopareiidae is part of the parvorder Furnariida in the New World suboscine radiation. This family had previously been placed with Rhinocryptidae on the basis of shared morphological characters, most notably a four-notched sternum, yet these species have other characters that set them apart from the rest of Rhinocryptidae, including a concealed white wing patch and slender build (Ericson *et al.* 2009). Analyses of DNA sequence data have indicated different affinities for melanopareiids (Chesser 2004, Moyle *et al.* 2009, Ohlson *et al.* 2013a), but they are definitely not included in Rhinocryptidae. Crescentchests may be sister to Conopophagidae (Ericson *et al.* 2009), or part of a clade that includes Conopophagidae and Thamnophilidae (Ohlson *et al.* 2013a). An alternative hypothesis (Moyle *et al.* 2009) suggests that Melanopareiidae is sister to the clade that contains all non-thamnophilid members of Furnariida. Clearly there is room for further work on relationships within Furnariida.





Crescentchests dart and skulk through the undergrowth in scrubby South American habitats, revealing their presence with throaty whistled staccato calls. The patient observer may catch a glimpse of a handsome bird, with a cream-colored throat bordered by a black mask above and a thin black crescent, this family's eponymous field mark, below. With longer tails than many of their relatives, and with rufous tones below or on the wings, birds of this newly erected family bear a greater resemblance to slight-proportioned buntings or sparrows than they do to gnateaters or antpittas.



Olive-crowed Crescentchest, *Melanopareia maximiliani*. Siberia Forest, Bolivia. © Dubi Shapiro.

*MELANOPAREIA*
4 species



*M. elegans*
Elegant Crescentchest

Passeriformes, New World Suboscines

# GRALLARIIDAE
## Antpittas

4 genera • 51 species

**Related Families** Rhinocryptidae (tapaculos)

**Similar Birds** Pittas (Pittidae), gnateaters (Conopophagidae), antbirds (Formicariidae)

**Description**
- Plumage usually rich brown above with gray or white below, often barred or streaked
- Wings small to medium; tail extremely short
- Body small to medium, ovoid, with upright posture
- Bill medium-short, inflated
- Head large; neck short, thick
- Legs and toes long
- Sexes similar

**Habitat** Antpittas live in dense Neotropical forests across a wide elevational range; the ranges of at least two species, Stripe-headed Antpitta *Grallaria andicolus* and Tawny Antpitta *G. quitensis*, extend above the Andean treeline.

**Food** Grallariids eat a variety of arthropods and other invertebrates, and they feed a similar array of insects and earthworms to their young.

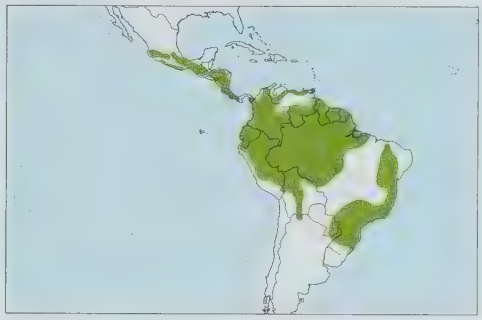
**Breeding** The breeding biology of antpittas is poorly known, as they live in heavily vegetated habitats and are generally very shy. However, it is thought that grallariids are predominantly monogamous with biparental care. The nests of fewer than half the species have been described, but those that have been are a simple cup of fine plant fibers, particularly small rootlets or strands of fungi, placed on a bed of leaves and small sticks. Nests are most often placed on a branch at a fork or against the trunk. Nest height varies, usually between 1 and 3 m. Some *Grallaria* species also build nests on fallen logs, low bushes and vines, or in palm leaves, and one species of *Hylopezus* has been reported to adopt the abandoned nests of other species. Female antpittas lay 1 to 3 eggs, although a typical full clutch is 2 eggs. Both adults appear to participate in nest construction, incubation, and feeding of the young, though in at least one species it appears that the female alone incubates. Incubation takes about 16 to 17 days, and the nestlings are in the nest for about 15 to 20 days, leaving the nest before they can fly, presumably not an extreme handicap for these largely terrestrial creatures.

**Conservation** Because many grallariids have extremely restricted ranges, 21 species (41%)



Bicolored Antpitta, *Grallaria rufocinerea*.
Reserva Río Blanco, Manizales, Colombia. © Dubi Shapiro.





These earth-toned ground birds of Neotropical undergrowth are far more often revealed by their whistled calls than by direct observation. Standing erect on long legs and sporting very short tails, they move through the forest with flexible hops, pausing to toss litter aside in search of their insect prey. Their common name is appropriate only to a point: antpittas have a body profile and habits that are convergent with the Old World pittas, but no antpittas appear to have a particularly strong association with ants. Most aspects of their biology remain mysterious, and, with reports of chicks that feign death when discovered by predators in the nest and mock-injured distraction displays in the parents, there is much more to learn about these distinctive birds.



Chestnut-crowned Antpitta, *Grallaria ruficapilla*. Refugio Paz de las Aves, Pichincha, Ecuador. © Nick Athanas.

are threatened with habitat destruction (8 NT, 8 VU, 3 EN, 2 CR). The Tachira Antipitta *Grallaria chthonia* and Urrao Antpitta *G. fenwickorum* have small ranges in northwestern Colombia, and both are listed as critically endangered because of deforestation. The endangered Ochre-fronted Antpitta *Grallaricula ochraceifrons*, found only in eastern Peru, is also threatened by deforestation in its restricted range.

Relationships Grallariidae is in the parvorder Furnariida of the New World radiation of suboscine passerines. The members of this family share similar overall morphology and ecology, and were long thought to belong in a larger family with the current Formicariidae. However, recent DNA studies indicate that Grallariidae and Formicariidae are only distantly related within the New World suboscine radiation. Chesser (2004) found that Grallariidae appeared to be at the base of a ladderized phylogeny, sister to a clade including Rhinocryptidae, Formicariidae, and Furnariidae. With limited sampling outside the group, Rice (2005a) found the grallariids in a polytomy with rhinocryptids and formicariids. With much broader taxonomic sampling, Moyle *et al.* (2009) found Grallariidae sister to Rhinocryptidae, while Ohlson *et al.* (2013a) suggested an alternative relationship with Grallariidae sister to a large clade that includes Rhinocryptidae, Formicariidae, and Furnariidae (see also Irestedt *et al.* 2009a). We tentatively adopt the sister relationship between Grallariidae and Rhinocryptidae here. DNA studies of relationships within Grallariidae reveal the *Grallaria* antpittas as a well-supported monophyletic group that is sister to a group comprising all of the remaining small antpittas (Rice 2005b, Moyle *et al.* 2009, Ohlson *et al.* 2013a). Within this clade of smaller antpittas, *Hylopezus* is sister to *Myrmothera*, and these two together are in turn sister to *Grallaricula* (Rice 2005b).



Giant Antpitta, *Grallaria gigantea*. Refugio Paz de las Aves, Pichincha, Ecuador. © Dubi Shapiro



*GRALLARIA*
32 species

*G. andicolus*
Stripe-headed Antpitta



*HYLOPEZUS*
9 species

*H. perspicillatus*
Streak-chested Antpitta



*MYRMOTHERA*
2 species

*M. campanisona*
Thrush-like Antpitta



*GRALLARICULA*
8 species

*G. peruviana*
Peruvian Antpitta

Passeriformes, New World Suboscines

# RHINOCRYPTIDAE
## Tapaculos

12 genera • 59 species

**Related Families** Grallariidae (antpittas), Furnariidae (ovenbirds), Formicariidae (ant-thrushes)

**Similar Birds** Wrens (Troglodytidae), ant-thrushes (Formicariidae), antpittas (Grallariidae)

**Description**
- Plumage cryptic, with shades of black, brown, and gray dominant in most and with orange or reddish brown accents in many
- Wings short, rounded; tail short to medium-long, carried erect
- Body very small to medium, ovoid, with hunched posture in most
- Bill medium length, sharp; nostrils with operacular flap (Rhinocryptidae means "hidden nose")
- Head small to medium; neck short, thick
- Legs medium to long; toes and claws long
- Sexes similar

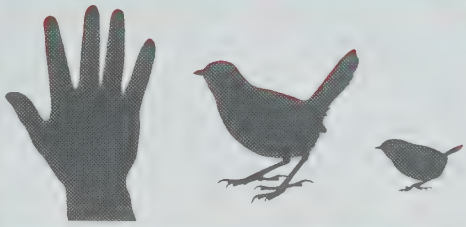
**Habitat** Tapaculos live on or near the ground in a wide variety of habitats, ranging from lowland tropical rainforest to páramo and puna above treeline in the Andes. Even above treeline, tapaculos conceal themselves by scurrying among grass tussocks and rocks.

**Food** It is believed that tapaculos feed primarily on arthropods, especially insects and spiders, but fruit and seeds are also taken. Some species glean insects from leaves and other substrates, but most others seem to scratch in the soil surface with one foot or with a two-footed "kick-scratch," much like many sparrows and towhees (Passerellidae).

**Breeding** Very little is known of the breeding biology of the rhinocryptids, although they are presumed to be monogamous. The nests of many species remain undescribed, but they seem most often to be either cup-shaped or globular and constructed of a few small twigs and soft plant fibers and mosses. A few species place their nests in dense grass or shrubs up to a couple of meters above ground, but most species place their nest among tree roots or in a tunnel in the ground, self-excavated or appropriated from a burrowing rodent. Some species nest in rotten stumps or abandoned tree cavities, occasionally many meters above the ground. Tapaculos lay 2 or 3, occasionally 4, white and almost spherical eggs. There is very limited information available, but it appears that incubation takes about 15 to 17 days and that chicks are in the nest for a couple of weeks. Males apparently help with parental



Moustached Turca, *Pteroptochos megapodius*. Near Santiago, Chile. © D. W. Winkler.

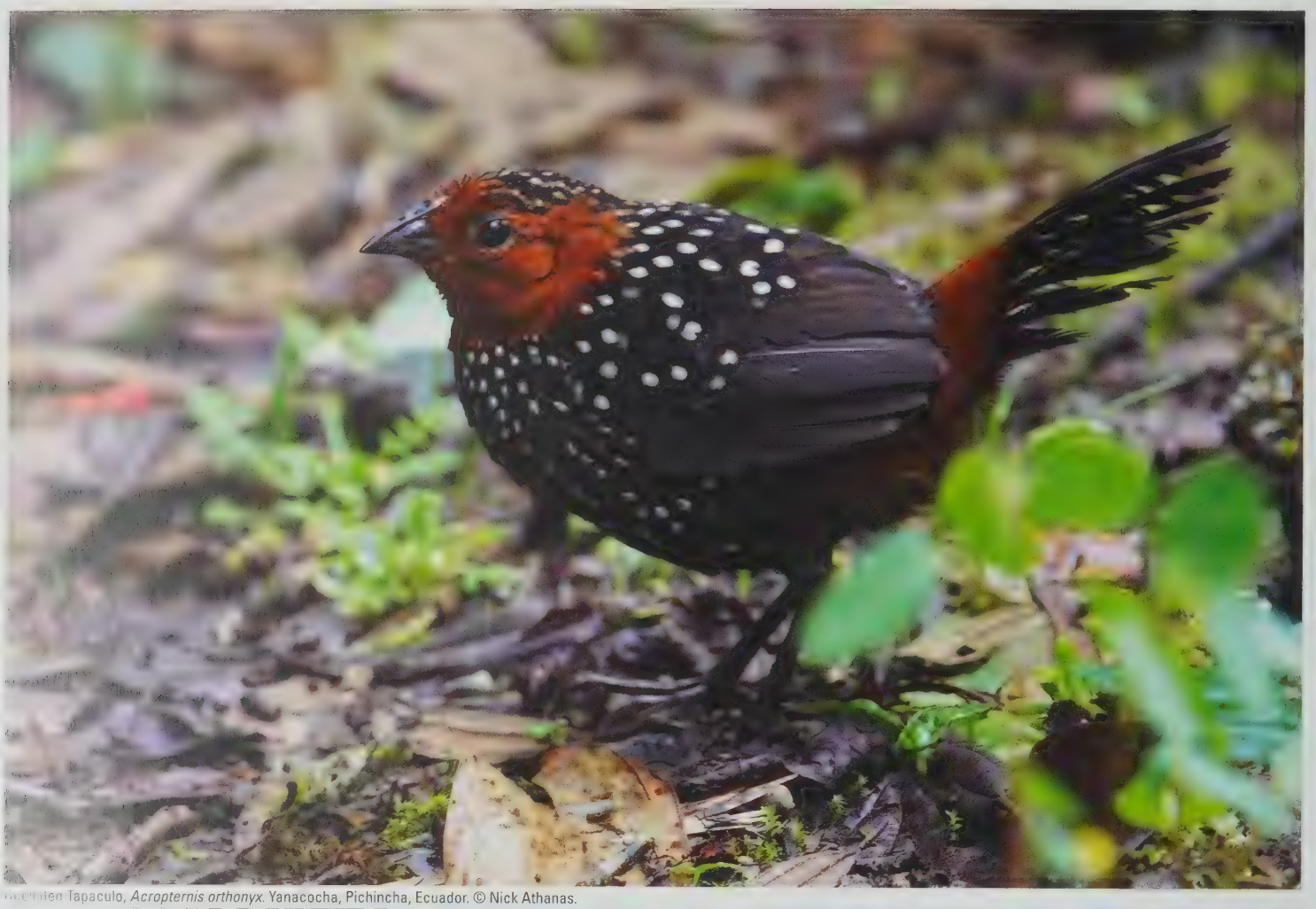




Tapaculos are among the most secretive Neotropical birds, most species being shy denizens of dense undergrowth habitats ranging from lowland forest to high-altitude puna. Usually they reveal themselves only by their repeated whistled calls. Most are ground birds that fly very little. Questions have been raised about whether some of the smallest species, in the genus *Scytalopus*, are even capable of flight, for they take this family's crypsis and secretive nature to the extreme; in their habit of scurrying through the vegetation, they resemble small mice far more than they do any bird. The name "tapaculo" derives from an off-color Spanish phrase describing the habit of most species covering their rump with their tail cocked over their back.



Puna Tapaculo, *Scytalopus simonsi*. Abra Malaga Pass, Peru. © Mark A. Chappell.



Rufous-vented Tapaculo, *Acropternis orthonyx*. Yanacocha, Pichincha, Ecuador. © Nick Athanas.



Nariño Tapaculo, *Scytalopus vicinior*. Las Tángaras Reserve, Chocó, Colombia. © Dubi Shapiro.

diurnal in some species and not in others, but generalizations seem premature. There are few families of birds that present such a challenging opportunity to add to our knowledge of the life histories of birds of the world.

**Conservation** Habitat destruction and fragmentation are the main conservation concern for ten (17%) rhinocryptid species (4 NT, 1 VU, 3 EN, 2 CR). The two critically endangered species, Stresemann's Bristlefront *Merulaxis stresemanni* and Bahia Tapaculo *Eleoscytalopus psychopompus*, both have small ranges in the highly threatened Atlantic Forest region of Brazil. Similarly, the three endangered *Scytalopus* species have extremely small known ranges.

**Relationships** Rhinocryptidae is in the parvorder Furnariida of the New World suboscine radiation. Within this radiation, tapaculos may be sister to Grallariidae, and these two taken together would then be sister to a clade that contains Formicariidae and Furnariidae (Moyle *et al.* 2009). Other studies suggest either that Rhinocryptidae is sister to a large radiation that includes Formicariidae and Furnariidae (Irestedt *et al.* 2009a, Ohlson *et al.* 2013a), or that it is part of a polytomy that includes these two families, which are in turn sister to Grallariidae (Ericson *et al.* 2009). The crescentchests (Melanopareiidae) had often been included in Rhinocryptidae based on morphological characters, but molecular phylogenetic studies have now shown that Melanopareiidae and Rhinocryptidae are not each other's closest relatives (Chesser 2004, Ericson *et al.* 2009, Moyle *et al.* 2009, Ohlson *et al.* 2013a). Relationships within Rhinocryptidae are not yet fully resolved, as a thorough study of the family with all genera sampled has not yet been conducted. Two well-supported clades are consistently recovered in studies that include multiple genera, one including the speciose *Scytalopus* tapaculos and close relatives in the subfamily Scytalopinae, and another including many of the larger tapaculos, as well as the Spotted Bamboowren *Psilorhamphus guttatus*, in the subfamily Rhinocryptinae (Moyle *et al.* 2009, Ohlson *et al.* 2013a).

## Subfamily RHINOCRYPTINAE

*PTEROPTOCHOS*
3 species

*P. tarnii*
Black-throated Huet-huet

*SCELORCHILUS*
2 species

*S. albicollis*
White-throated Tapaculo

*LIOSCELES*
1 species

*L. thoracicus*
Rusty-belted Tapaculo

*PSILORHAMPHUS*
1 species

*P. guttatus*
Spotted Bamboowren

*ACROPTERNIS*
1 species

*A. orthonyx*
Ocellated Tapaculo

*RHINOCRYPTA*
1 species

*R. lanceolata*
Crested Gallito

*TELEDROMAS*
1 species

*T. fuscus*
Sandy Gallito

## Subfamily SCYTALOPODINAE

*ELEOSCYTALOPUS*
2 species

*E. psychopompus*
Bahia Tapaculo

*MERULAXIS*
2 species

*M. ater*
Slaty Bristlefront

*MYORNIS*
1 species

*M. senilis*
Ash-colored Tapaculo

*EUGRALLA*
1 species

*E. paradoxa*
Ochre-flanked Tapaculo

*SCYTALOPUS*
43 species

*S. atratus*
White-crowned Tapaculo

# FORMICARIIDAE

## Ant-thrushes

2 genera • 12 species

**Related Families** Furnariidae (ovenbirds), Rhinocryptidae (tapaculos), Grallariidae (antpittas)

**Similar Birds** Antbirds (Thamnophilidae), antpittas (Grallariidae), tapaculos (Rhinocryptidae)

**Description**

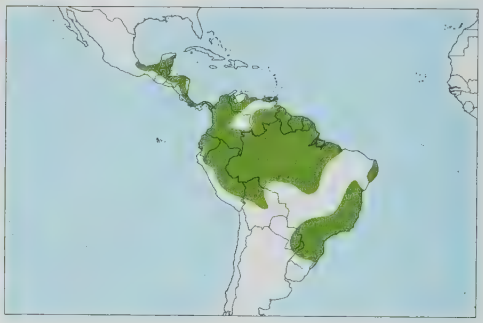
- Plumage earth toned; *Formicarius* ant-thrushes with large patches of color, *Chamaeza* ant-thrushes more finely patterned and cryptic
- Wings medium-short; tail short, held cocked when walking
- Body size medium, ovoid, generally with horizontal carriage
- Bill medium-long, straight, stout
- Head medium-sized, often with distinct bare eye-ring; neck thick
- Legs long; toes medium to long, thick
- Sexes similar

**Habitat** Formicariids live in dense, wet, tropical forests from sea level to mid-elevation montane regions.



Rufous-breasted Ant-thrush, *Formicarius rufipectus*. Pinchincha, Ecuador. © Benjamin Van Doren.





**Food** Ant-thrushes mainly eat invertebrates. However, some will occasionally catch and eat small snakes. Although formicariids occasionally follow army ant swarms, this foraging tactic is uncommon, and those that do so generally stay on the periphery of the swarm. Hardly ever leaving the ground while foraging, they typically walk along and periodically flip leaves in search of prey.

**Breeding** Although there is very little information on the breeding biology of this family, formicariids appear to be monogamous with biparental care. They construct dense platform nests of leaves, flower stalks, sticks, dried flowers, and sometimes even shed snake skins. This nest is placed in a cavity, either one formed naturally or one formerly used by another cavity-nesting species. Typically, female ant-thrushes lay 2 white eggs. Both parents help with incubation and feeding the chicks. The eggs take about two weeks to hatch and the chicks about two weeks to leave the nest. The chicks hatch with dark skin and long wispy gray down, at least in *Formicarius*.

**Conservation** Habitat loss and fragmentation threaten the only formicariid species (8%) of

Ant-thrushes are indeed vaguely thrush-like in their proportions, but the fact that they generally walk along the forest floor with their tail cocked high over their back weakens the resemblance in life. Their long strides are interspersed by pauses to look about for invertebrate prey, each foot-step being marked by a synchronized pumping of the head and tail. They nest in old tree cavities not too far from the ground, with the loose nest material placed on a floor that is sometimes so deep in rotten wood that it is beneath the surrounding ground surface. Like so many forest birds of the Neotropics, they are more often heard than seen, and familiarity with their throaty trilled whistles can be an essential guide to finding them.



Rufous-capped Ant-thrush, *Formicarius colma*. Serra dos Tucanos Lodge, Brazil. © Dubi Shapiro.

conservation concern (1 NT), the Rufous-fronted Ant-thrush *Formicarius rufifrons*, whose range is limited to moist lowland forests in western Amazonia.

**Relationships** Formicariidae is part of parvorder Furnariida in the New World suboscine radiation. Previously, it was often lumped with Grallariidae into a more inclusive Formicariidae; however, recent DNA studies have found that these two groups are not sister taxa (Chesser 2004, Rice 2005, Irestedt *et al.* 2009a, Moyle *et al.* 2009, Ohlson *et al.* 2013a). Rather, Formicariidae appears to be sister to Furnariidae (Chesser 2004, Irestedt *et al.* 2009a, Moyle *et al.* 2009, Ohlson *et al.* 2013a). The clade of these sister taxa taken together is in turn sister to Rhinocryptidae and Grallariidae (Chesser 2004, Irestedt *et al.* 2009a, Moyle *et al.* 2009, Ohlson *et al.* 2013a). Relationships within Formicariidae have not been fully investigated, as most studies of the relationships of the New World suboscines have only included a few antthrushes in their analyses. What evidence exists suggests that the two genera within the family are monophyletic sister groups (Rice 2005, Moyle *et al.* 2009).



Mexican Ant-thrush, *Formicarius moniliger*. Tikal, Guatemala. © Christian Artuso.

*FORMICARIUS*
6 species



*F. rufipectus*
Rufous-breasted Ant-thrush

*CHAMAEZA*
6 species



*C. campanisona*
Short-tailed Ant-thrush

# FURNARIIDAE

## Ovenbirds

**68 genera • 296 species**

**Related Families** Formicariidae (ant-thrushes), Rhinocryptidae (tapaculos), Grallariidae (antpittas)

**Similar Birds** Wrens (Troglodytidae), Old World flycatchers (Muscicapidae), thrushes (Turdidae), larks (Alaudidae), warblers (Cisticolidae, Scotocercidae, Locustellidae), babblers (Timaliidae)

**Description**

- Plumage generally varying shades of brown, with accents of gray, white, or black
- Wings short to medium, rounded; tail usually medium-long, with terminal stiffening or spines in many species
- Body small to large, ovoid; most species with horizontal carriage relative to the substrate
- Bill slender, with highly variable shape ranging from long and strongly decurved (as in *Campylorhamphus*) to slightly upturned (as in *Xenops* and *Pygarrhichas*)
- Head medium-sized; neck medium to short and thick
- Legs and toes generally medium-long
- Sexes similar

**Habitat** Furnariids live in all terrestrial habitats in the Neotropics that support any birds.

**Food** Most furnariids eat insects and other small arthropods, but larger woodcreepers also consume small vertebrates, including lizards and frogs. Most species forage by gleaning insects from leaves or bark crevices or by rummaging in leaf litter. Some *Cinclodes* species are unique among the Passeriformes in occupying a truly marine habitat, feeding intertidally on mollusks and crustaceans. Though they lack functional salt glands, these species effectively regulate their body fluids despite ingesting large quantities of salt. Woodcreepers, by contrast, scale trees. Different species of woodcreepers have slightly different foraging techniques owing to differences in bill shape. Some woodcreepers, including *Dendrocincla* and *Dendrocolaptes* species, sally for insects and are often associated with army ant swarms. Others forage in clusters of dead leaves, and still others, including *Xiphocolaptes* species, forage in epiphytes. Seeds and fruit are an important part of the diet of a few furnariids, most notably several species of *Geositta* miners.

**Breeding** Furnariids are monogamous. There are no documented cases of polygyny or polyandry in the family, and only a few species for which some level of cooperative breeding is



Rufous Cacholote, *Pseudoseisura unirufa*. Pousada Rio Mutum, Mato Grosso, Brazil. © D. W. Winkler.





One of the three mega-diverse families of Neotropical passerines, Furnariidae contains morphologically diverse species that occupy nearly all habitats in this region. With tails and bills adapted to nearly every insectivorous foraging niche, they are denizens of coastal rocks and Andean fell fields, and all forested habitats in between. They run on the ground and along branches, climb tree trunks, and burrow in the ground. The remarkable morphological diversity of the furnariids is paralleled by the greatest diversity of nest types of any bird family and a broad dietary array. Their plumage may be the one aspect that allows some generalization, and an alliterative aid to their recognition may be that the common names of many include the terms rufous, rusty, ruddy, or russet (and many are fulvous or fuscous).



Scimitar-billed Woodcreeper, *Drymornis bridgesii*. Taco Pozo, Chaco, Argentina. © Ian Davies.

known. The nests of the furnariids are the most diverse of any bird family. From the mud oven-shaped nests of the Rufous Hornero *Furnarius rufus* to the bulky thick-stick nests of the Firewood-gatherer *Anumbius annumbi*, nests in the open are often closed structures, but many nests are placed in burrows in the ground or in adopted tree cavities. Very few species, including the Band-tailed Hornero *Furnarius figulus* and Bay-capped Wren-Spinetail *Spartonoica maluroides*, build simple cup-shaped nests. Females lay 2 to 5 eggs, with larger clutches in species outside the tropics, and incubation takes two to three weeks. Both males and females of most furnariid species assist in nest construction, incubation, and the provisioning of chicks, and the chicks leave the nest after about two to four weeks, with longer periods in the larger species.

**Conservation** Habitat loss is the major threat for the 46 furnariid species (16%) that are of conservation concern (19 NT, 14 VU, 7 EN, 6 CR). As in other groups, species with limited ranges are especially at risk. All of the critically endangered furnariids have very small ranges. For instance, the Royal and White-bellied Cinclodes (*Cinclodes aricomae* and *C. palliatus*, respectively) are both endemic to tiny isolated patches of high-elevation habitats. Even worse, the Masafuera Rayadito *Aphrastura masafucrae* is endemic to the most remote island in the distant Juan Fernandez Islands, where, in addition to habitat destruction, it may be suffering from predation by introduced rats and cats.

**Relationships** Furnariidae is exceptional in both the number and morphological variety of the species it contains. Part of the parvorder Furnariida, Furnariidae is most likely sister to Formicariidae, and the two taken together are most likely sister to Rhinocryptidae (Chesser 2004, Irestedt *et al.* 2009a, Ohlson *et al.* 2013a) or to a clade made up of Rhinocryptidae plus Grallariidae (Moyle *et al.* 2009). In the past, the morphologically distinct woodcreepers were usually placed in their own family, Dendrocolaptidae; however, recent molecular phylogenies have shown them to be embedded within Furnariidae, with *Sclerurus* and *Geositta*, in the subfamily Scleruriinae, being sister to the woodcreepers (Dendrocolaptinae) and the rest of the Furnariidae in the subfamily Furnariinae (Irestedt *et al.* 2009a, Moyle *et al.* 2009, Derryberry *et al.* 2011, Ohlson *et al.* 2013a). Many formerly large genera, including *Asthenes*, have been found to be paraphyletic and have been split to retain monophyly of each genus (Irestedt *et al.* 2009a, Moyle *et al.* 2009, Derryberry *et al.* 2011, Ohlson *et al.* 2013a). Within the largest subfamily of the group, Furnariinae, Philydorini is sister to Furnariini, and these together are in turn sister to the large and diverse Synallaxini (Derryberry *et al.* 2011).



Rufous Hornero, *Furnarius rufus*. Pousada Rio Claro, Mato Grosso, Brazil. © D. W. Winkler.



Montane Woodcreeper, *Lepidocolaptes lacrymiger*. Corani Aqueduct Road, Cochabamba, Bolivia. © Ian Davies.

## Subfamily SCLERURINAE

*SCLERURUS*
6 species



*S. scansor*
Rufous-breasted Leaftosser

*GEOSITTA*
11 species



*G. cunicularia*
Common Miner

## Subfamily DENDROCOLAPTINAE (1 OF 2)

### Tribe Sittasomini

*CERTHIASOMUS*
1 species



*C. stictolaemus*
Spot-throated Woodcreeper

*DECONYCHURA*
1 species



*D. longicauda*
Long-tailed Woodcreeper

*SITTASOMUS*
1 species



*S. griseicapillus*
Olivaceous Woodcreeper

*DENDROCINCLA*
6 species



*D. merula*
White-chinned Woodcreeper

### Tribe Dendrocolaptini (1 of 2)

*GLYPHORYNCHUS*
1 species



*G. spirurus*
Wedge-billed Woodcreeper

*DENDREXETASTES*
1 species



*D. rufigula*
Cinnamon-throated
Woodcreeper

*NASICA*
1 species



*N. longirostris*
Long-billed Woodcreeper

*DENDROCOLAPTES*
6 species



*D. certhia*
Amazonian Barred Woodcreeper

*HYLEXETASTES*
2 species



*H. perrotii*
Red-billed Woodcreeper

*XIPHOCOLAPTES*
4 species



*X. promeropirhynchus*
Strong-billed Woodcreeper

*XIPHORHYNCHUS*
13 species



*X. guttatus*
Buff-throated Woodcreeper

*DENDROPLEX*
2 species



*D. picus*
Straight-billed Woodcreeper

## Subfamily Dendrocolaptinae (2 of 2)

### Tribe Dendrocolaptini (2 of 2)

*Campylorhamphus*
6 species



*C. trochilirostris*
Red-billed Scythebill

*Drymotoxeres*
1 species



*D. pucherani*
Greater Scythebill

*Drymornis*
1 species



*D. bridgesii*
Scimitar-billed Woodcreeper

*Lepidocolaptes*
9 species



*L. souleyetii*
Streak-headed Woodcreeper

## Subfamily Furnariinae (1 of 3)

### Tribe Xenopini

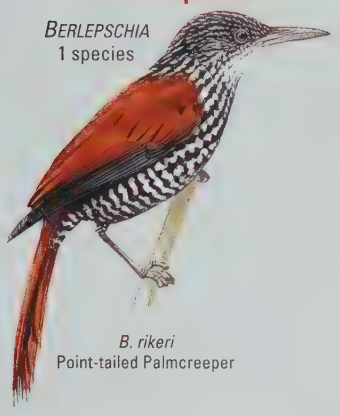
*Xenops*
3 species



*X. minutus*
Plain Xenops

### Tribe Berlepschiini

*Berlepschia*
1 species



*B. rikeri*
Point-tailed Palmcreeper

*Microxenops*
1 species



*M. milleri*
Rufous-tailed Xenops

### Tribe Pygarrhichadini

*Pygarrhichas*
1 species



*P. albogularis*
White-throated Treerunner

*Ochetorhynchus*
4 species



*O. ruficaudus*
Straight-billed Earthcreeper

### Tribe Furnariini

*Pseudocolaptes*
2 species



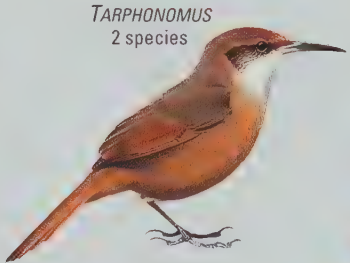
*P. boissonneautii*
Streaked Tuftedcheek

*Premnornis*
1 species



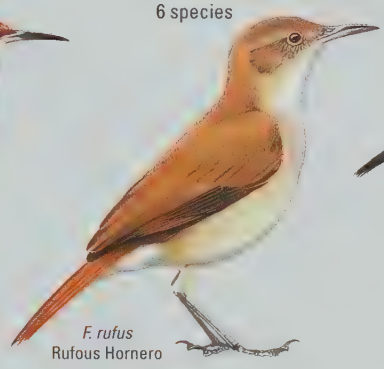
*P. guttuliger*
Rusty-winged Barbtail

*Tarphonomus*
2 species



*T. certhioides*
Chaco Earthcreeper

*Furnarius*
6 species



*F. rufus*
Rufous Hornero

*Lochmias*
1 species



*L. nematura*
Sharp-tailed Streamcreeper

*Phleocryptes*
1 species



*P. melanops*
Wren-like Rushbird

*Limnornis*
1 species



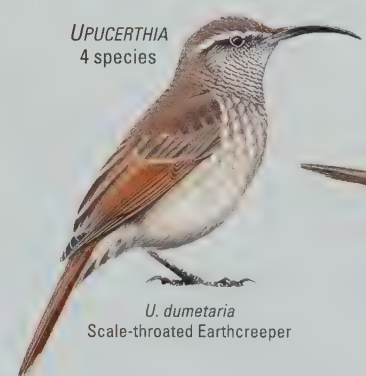
*L. curvirostris*
Curve-billed Reedhaunter

*Geocerthia*
1 species



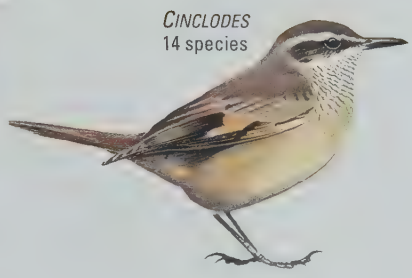
*G. serrana*
Striated Earthcreeper

*Upucerthia*
4 species



*U. dumetaria*
Scale-throated Earthcreeper

*Cinclodes*
14 species



*C. fuscus*
Bar-winged Cinclodes

## Subfamily **Furnariinae (2 of 3)**

### Tribe **Philydorini**

*Anabazenops*
2 species



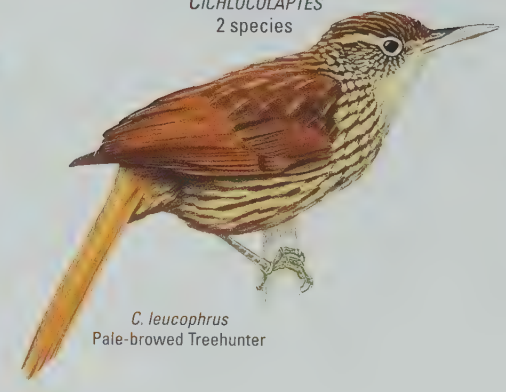
*A. fuscus*
White-collared Foliage-gleaner

*Megaxenops*
1 species



*M. parnaguae*
Great Xenops

*Cichlocolaptes*
2 species



*C. leucophrus*
Pale-browed Treehunter

*Heliobletus*
1 species



*H. contaminatus*
Sharp-billed Treehunter

*Philydor*
7 species



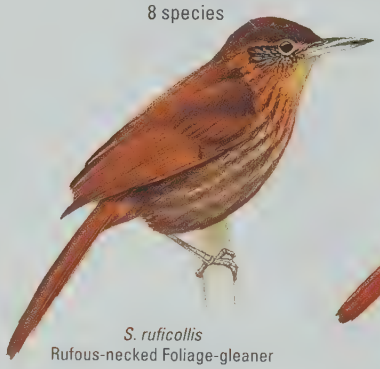
*P. rufum*
Buff-fronted Foliage-gleaner

*Anabacerthia*
5 species



*A. variegaticeps*
Scaly-throated Foliage-gleaner

*Syndactyla*
8 species



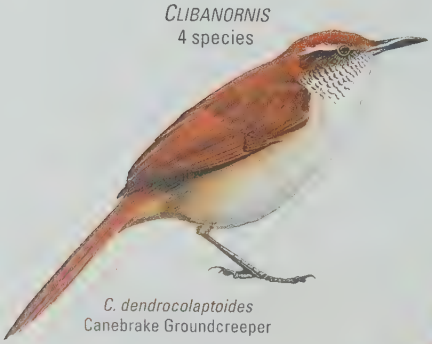
*S. ruficollis*
Rufous-necked Foliage-gleaner

*Ancistrops*
1 species



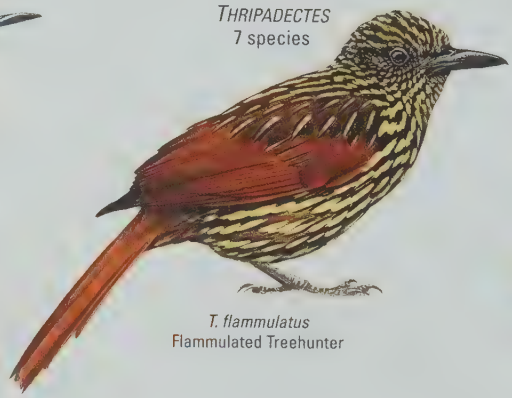
*A. strigilatus*
Chestnut-winged Hookbill

*Clibanornis*
4 species



*C. dendrocolaptoides*
Canebrake Groundcreeper

*Thripadectes*
7 species



*T. flammulatus*
Flammulated Treehunter

*Automolus*
6 species



*A. infuscatus*
Olive-backed Foliage-gleaner

### Tribe **Synallaxini (1 of 2)**

*Premnoplex*
2 species



*P. brunnescens*
Spotted Barbtail

*Margarornis*
4 species



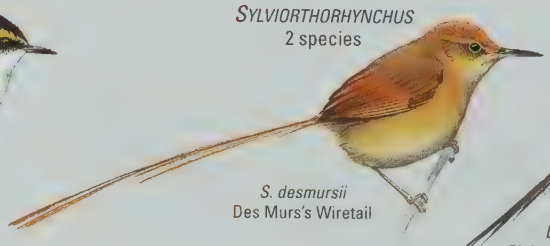
*M. squamiger*
Pearled Treerunner

*Aphrastura*
2 species



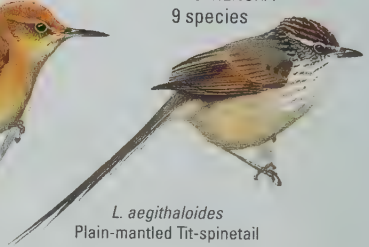
*A. spinicauda*
Thorn-tailed Rayadito

*Sylviorthorhynchus*
2 species



*S. desmursii*
Des Murs's Wiretail

*Leptasthenura*
9 species

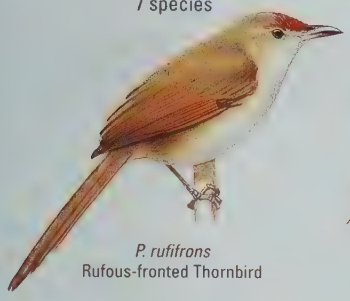


*L. aegithaloides*
Plain-mantled Tit-spinetail

## Subfamily FURNARIINAE (3 OF 3)

## Tribe Synallaxini (2 of 2)

*PHACELLODOMUS*
7 species



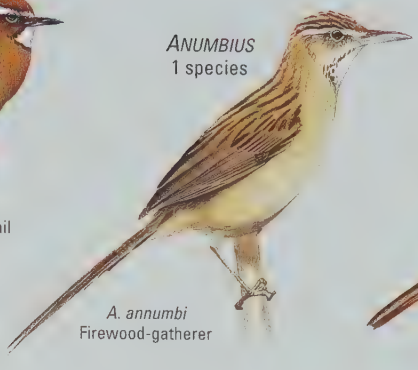
*P. rufifrons*
Rufous-fronted Thornbird

*HELLMAYREA*
1 species



*H. gularis*
White-browed Spinetail

*ANUMBIUS*
1 species



*A. annumbi*
Firewood-gatherer

*CORYPHISTERA*
1 species



*C. alaudina*
Lark-like Brushrunner

*ASTHENES*
27 species



*A. flammulata*
Many-striped Canastero

*ACROBATORNIS*
1 species



*A. fonsecai*
Pink-legged Graveteiro

*METOPOTHRIX*
1 species



*M. aurantiaca*
Orange-fronted Plushcrown

*XENERPESTES*
2 species



*X. minlosi*
Double-banded Graytail

*SIPTORNIS*
1 species



*S. striaticollis*
Spectacled Prickletail

*RORAIMIA*
1 species



*R. adusta*
Roraiman Barbtail

*THRIPOPHAGA*
5 species



*T. fusciceps*
Plain Softtail

*LIMNOCTITES*
1 species



*L. rectirostris*
Straight-billed Reedhaunter

*CRANIOLEUCA*
20 species



*C. albiceps*
Light-crowned Spinetail

*PSEUDASTHENES*
4 species



*P. humicola*
Dusky-tailed Canastero

*SPARTONOICA*
1 species



*S. maluroides*
Bay-capped Wren-Spinetail

*PSEUDOSEISURA*
4 species



*P. lophotes*
Brown Cachalote

*SCHOENIOPHYLAX*
1 species



*S. phryganophilus*
Chotoy Spinetail

*CERTHIAXIS*
2 species



*C. mustelinus*
Red-and-white Spinetail

*SYNALLAXIS*
36 species



*S. azarae*
Azara's Spinetail

# PIPRIDAE
## Manakins

17 genera • 51 species

**Related Families** Cotingidae (cotingas), Tityridae (tityras), Tyrannidae (tyrant flycatchers)

**Similar Birds** Flowerpeckers (Dicaeidae), pardalotes (Pardalotidae), euphonias (Fringillidae), small birds-of-paradise (Paradisaeidae),

**Description**
- Male plumage generally black with red, yellow, or blue highlights, females dull yellow-olive in most species
- Wings short, rounded, with highly modified remiges in some species; tail short, with elongated central rectrices in some species
- Body very small to small, ovoid
- Bill short, broad
- Head large; neck short
- Legs short; toes long
- Strong sexual dimorphism; males usually more brightly colored, many with distinctive feather morphology

**Habitat** Piprids live in forested Neotropical habitats, ranging from lowland tropical rainforest to montane cloud forest.

**Food** Manakins feed on a wide variety of small fruits, and some species are obligate frugivores. However, insects and other small arthropods make up a small proportion of the diet of many species. Food is obtained by sallying or gleaning. Manakin leks are often located near abundant sources of food. Nestlings appear to be fed mostly fruit.

**Breeding** With few if any exceptions, manakins are polygynous with female-only care. Males of many species perform distinctive displays at leks. In the Long-tailed Manakin *Chiroxiphia linearis*, a pair of males cooperates in the mating display, where each male alternately jumps and calls to a visiting female; only the dominant male mates with the female. Male Club-winged Manakins *Machaeropterus deliciosus* have highly modified secondaries in the wing that are rubbed together rapidly to stridulate, producing short ringing tones to impress females. Manakin nests are typically small cups constructed from rootlets, moss, lichens, and other plant materials and suspended from a horizontal fork, usually in low branches. Females typically lay 2 relatively large eggs, 48 hours apart. Females are solely responsible for nest construction, incubation, and feeding the

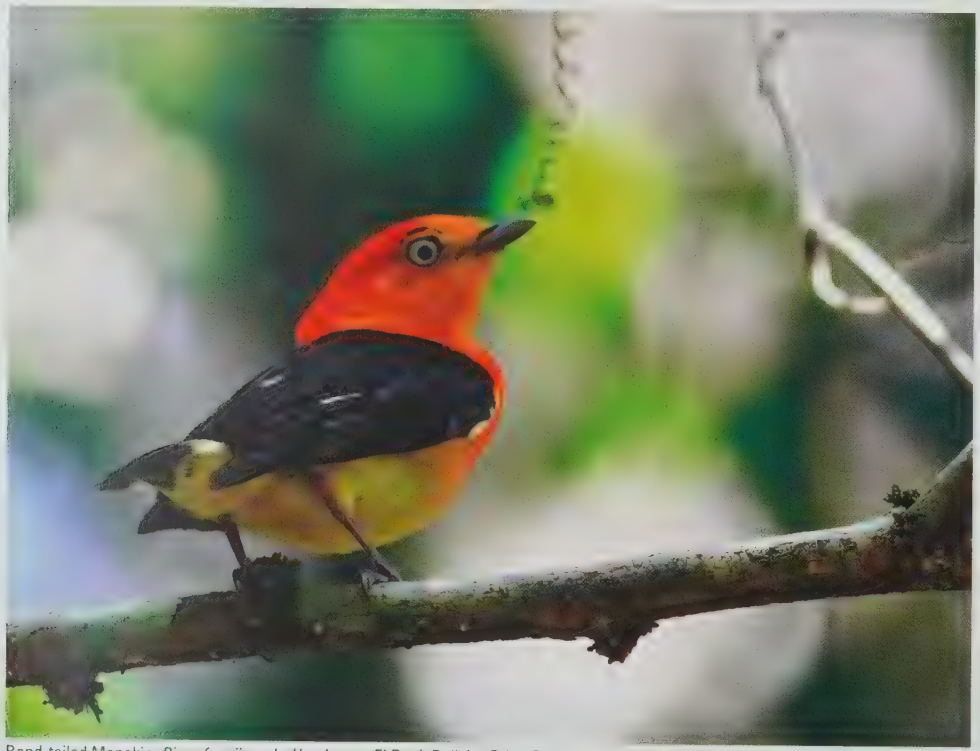


Helmeted Manakin, *Antilophia galeata*.
Serra do Cipó NP, Brazil. © Dubi Shapiro.





Tiny frugivores of Neotropical forests, these large-headed, short-tailed birds are strikingly dimorphic: females are uniformly plain olive-green, whereas males of most species are black or white with vibrant patches of red, yellow, or blue. This dimorphism evinces highly derived mating displays, with most species displaying in small leks, showing off their sights and sounds alone or in cooperative duets. Many species also emit different non-vocal sounds in display, most produced by clapping their wing feathers together. Manakin nests are tiny to reduce their visibility to predators, and in some species the posture of incubating females is very upright with the tail out of the nest, making them look more like birds that are perched than ones sitting on eggs.



Band-tailed Manakin, *Pipra fasciicauda*. Hamburgo, El Beni, Bolivia. © Ian Davies.

chicks. Incubation takes 16 to 19 days, relatively long for such a small bird, yet nestling periods are shorter, on the order of 13 to 15 days.

**Conservation** The logging of Neotropical forests is affecting most forest birds in the region, and five piprid species (10%) face conservation concerns (1 NT, 3 VU, 1 CR). The critically endangered Araripe Manakin *Antilophia bokermanni*, not described until 1998, and the three vulnerable species are all imperiled by the combination of ongoing habitat conversion and very small to tiny ranges and populations.



Fiery-capped Manakin, *Machaeropterus pyrocephalus*. Moyobamba, San Martín, Peru. © Dubi Shapiro.

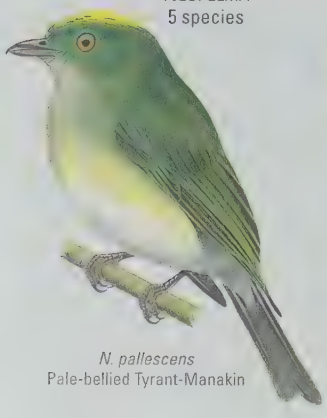
**Relationships** Pipridae is in the parvorder Tyrannida of the New World suboscine radiation (Sibley & Ahlquist 1990, Tello *et al.* 2009, Ohlson *et al.* 2013a, Cracraft 2014). This family has sometimes contained taxa that now clearly belong elsewhere. *Schiffornis* species, once called thrush-like manakins, are now clearly better placed in Tityridae, while the genera *Piprites* and *Neopipo*, at times treated as in Pipridae, are instead in the Tyrannidae (Tello *et al.* 2009, Ohlson *et al.* 2013a,b). *Sapayoa*, once named Broad-billed Manakin, has been found to be very distant from the manakins, and instead forms a monotypic family, Sapayoidae, as the sole New World representative of the Old World suboscine radiation (Irestedt *et al.* 2006a, Moyle *et al.* 2006a). Within Tyrannida, Pipridae has always been hard to place. Morphological studies (Prum & Lanyon 1989) suggested that the manakins were closely related to the cotingas, although McKitrick (1985) had suggested that the manakins were more closely related to part of the tyrant flycatcher radiation. Early genetic studies based on DNA-DNA hybridization found Pipridae to be sister to Cotingidae (Sibley & Ahlquist 1990). Recent genetic work has also been unable to completely resolve the position of Pipridae. Chesser (2004) found Pipridae sister to Tityridae, Tello *et al.* (2009) found it sister to the rest of Tyrannida, Ericson *et al.* (2006b) found it to be sister to Cotingidae, and most recently, Ohlson *et al.* (2013a) found it in a polytomy with Cotingidae and the rest of Tyrannida (Barber & Rice 2007). Relationships within Pipridae have recently been clarified by Ohlson *et al.* (2013b), and the tyrant-manakins (*Neopelma* and *Tyranneutes* species), which exhibit little or no sexual dimorphism, form a monophyletic clade sister to all the other manakins.



Crimson-hooded Manakin, *Pipra aureola*. Óbidos, Pará, Brazil. © Marcelo Barreiros.

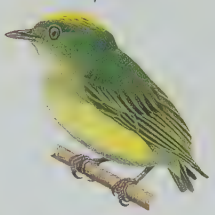
## Subfamily NEOPELMINAE

### NEOPELMA
5 species



*N. pallescens*
Pale-bellied Tyrant-Manakin

### TYRANNEUTES
2 species



*T. virescens*
Tiny Tyrant-Manakin

## Subfamily PIPRINAE

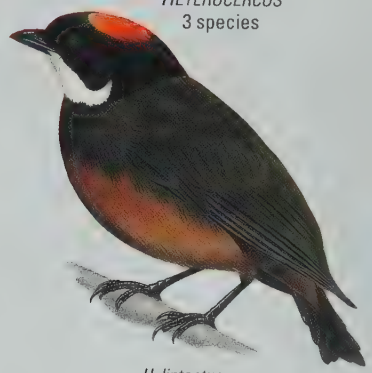
## Tribe Piprini

### XENOPIPO
2 species



*X. atronitens*
Black Manakin

### HETEROCERCUS
3 species



*H. linteatus*
Flame-crested Manakin

### MANACUS
4 species



*M. manacus*
White-bearded Manakin

### PIPRA
3 species



*P. filicauda*
Wire-tailed Manakin

### MACHAEROPTERUS
4 species



*M. deliciosus*
Club-winged Manakin

### DIXIPHIA
1 species



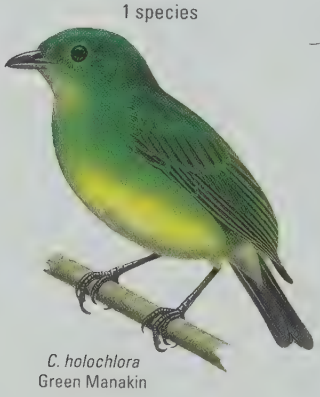
*D. pipra*
White-crowned Manakin

### CERATOPIPRA
5 species



*C. mentalis*
Red-capped Manakin

### CRYPTOPIPO
1 species



*C. holochlora*
Green Manakin

### CHLOROPIPO
2 species



*C. unicolor*
Jet Manakin

### LEPIDOTHRIX
8 species



*L. serena*
White-fronted Manakin

## Tribe Ilicurini

### ILICURA
1 species



*I. militaris*
Pin-tailed Manakin

### MASIUS
1 species



*M. chrysopterus*
Golden-winged Manakin

### CORAPIPO
2 species



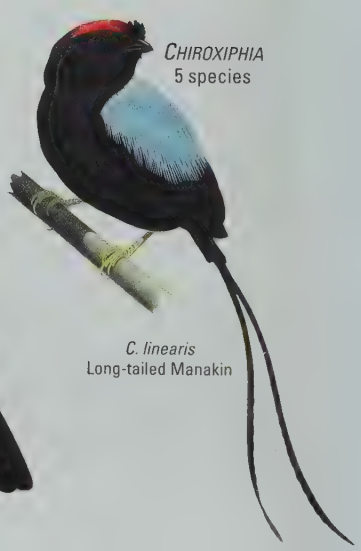
*C. leucorrhoa*
White-ruffed Manakin

### ANTILOPHIA
2 species



*A. bokermanni*
Araripe Manakin

### CHIROXIPHIA
5 species



*C. linearis*
Long-tailed Manakin

Passeriformes, New World Suboscines

# COTINGIDAE
## Cotingas

25 genera • 65 species

**Related Families** Tityridae (tityras), Pipridae (manakins), Tyrannidae (tyrant flycatchers)

**Similar Birds** Tityras (Tityridae), birds-of-paradise (Paradisaeidae), bowerbirds (Ptilonorhynchidae), crows (Corvidae)

**Description**

- Most species boldly patterned and brightly colored, with large patches of black, red, orange, white, green, purple, or blue; a few species simply brown or olive
- Wings medium-long, broad; tail short in most species
- Body small to large, cylindrical ovoid
- Bill medium-short, straight, thin but broad in most species, some with gular pouch or wattles
- Head medium to large, with distinct crest in some species; neck thick
- Legs short; feet small
- Males usually more brightly colored and boldly patterned than females



Bay-vented Cotinga, *Doliornis sclateri*. Bosque Unchog, Huánuco, Peru. © Dubi Shapiro.



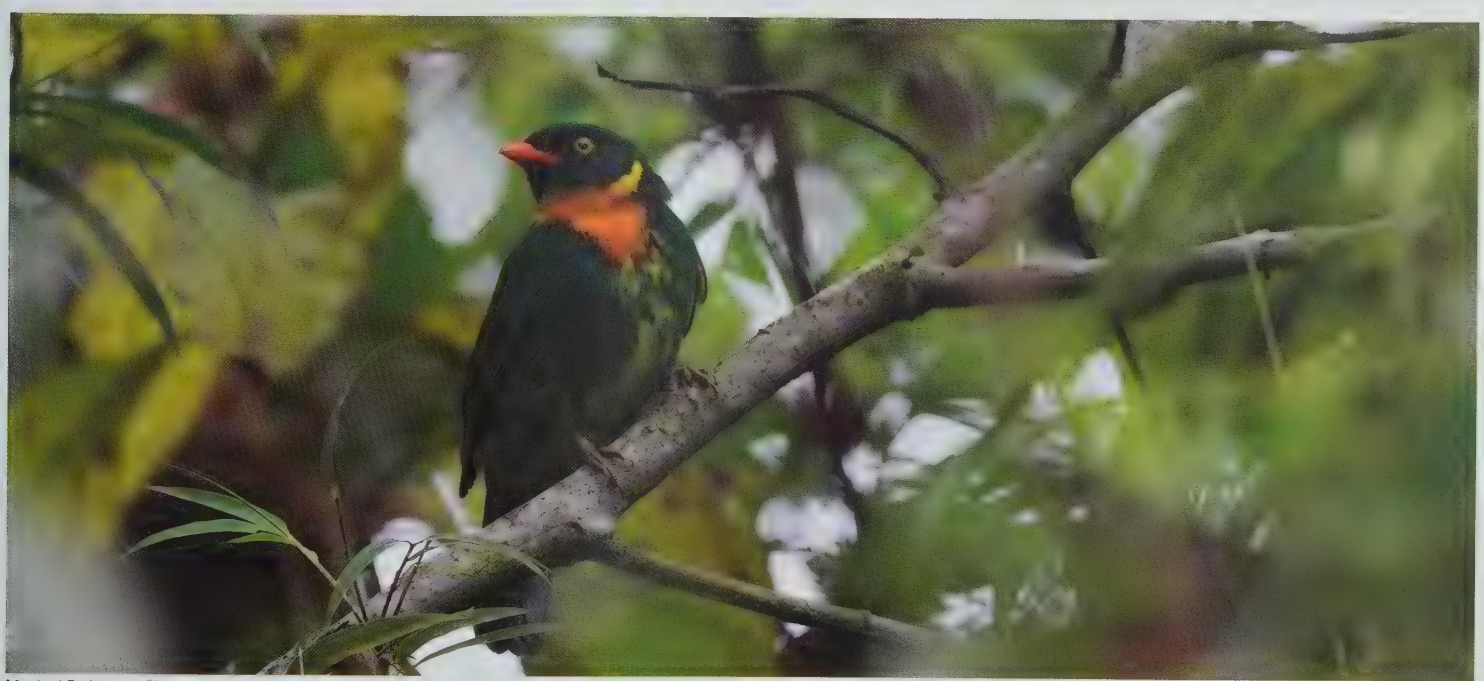


**Habitat** Most cotingas live in densely vegetated forest and woodland habitats, ranging from lowland tropical rainforest to montane cloud forest. A few species, especially in temperate South America, extend into open scrubland and woodlands.

**Food** Most cotingas feed exclusively or almost exclusively on fruits. A small proportion of the diet, especially of the larger species, includes invertebrates, mainly insects, and small frogs and lizards. The *Phytotoma* plantcutters feed primarily on leaves, and to a lesser degree on flowers and fruit. They appear to select leaves that are relatively high in protein.

**Breeding** The breeding biology of most cotingids is extremely poorly known. Many species are polygynous with female-only care and lek breeding, though some are monogamous with biparental care. The nests of those that have been studied are variable. Many *Pipreola*, *Xiphocolaena*, and *Carpodectes* species build a small cup platform of rootlets, lichens, and other plant material. Nests of the umbrellabirds (*Cephalopterus*) are usually large platforms constructed primarily of sticks. The cocks-of-the-rock (*Rupicola*) build a nest of mud and plant material that is fixed to a vertical rock face, sometimes in a shallow cave or other rock crevice. Females typically lay 1 or 2 eggs. In polygynous species, only the female provides any care to the chicks, constructing the nest and incubating the eggs alone. In monogamous species, such as the

No family of birds exhibits more diversity of auditory, behavioral, and plumage elaborations, all the result of rampant sexual selection, than do the cotingas. The species in this family vary in size, some as small as sparrows, others larger than crows. Some species are bizarrely colorful, others highly cryptic, with calls as divergent as the clarion calls of bellbirds and the calf-like mewing of the Capuchinbird. Males of many cotinga species group together in leks to display for females during the breeding season. In at least one species the lekking birds create their own forested habitat by regurgitating seeds that then germinate and grow up around them over the years of their traditional lek-site usage.



Masked Fruiteater, *Pipreola pulchra*. Villa Rica-Oxapampa Road, Pasco region, Peru. © Nick Athanas.

fruit-eaters, both male and female construct the nest; only the female incubates the eggs, although both male and female actively feed the chicks. Embryonic development rates appear very slow, and incubation takes 17 to 28 days. The chicks leave the nest after 28 to 48 days in the nest. The one exception to these slow rates of development appears to be the *Phytotoma* plantcutters, which have incubation periods of about 14 days and nestling periods of only about 17 days.

**Conservation** More than one-third of cotingid species (35%) are threatened by habitat conversion, which exacerbates the problems of small ranges and small global population sizes (6 NT, 11 VU, 5 EN). The endangered cotingid species occur in disjunct places in Central and South America, and they include species in five disparate genera (*Phytotoma*, *Cotinga*, *Xipholena*, *Lipaugus*, and *Carpodectes*).

**Relationships** The cotingas are part of the parvorder Tyrannida in the New World suboscine radiation. Relationships within and among the cotingids and their allies have long bedeviled avian taxonomists, but recent molecular analyses have begun to resolve these relationships. Chesser (2004) found the cotingas to be in a polytomy with two clades: one consisting of tityras and manakins, and the other the Tyrannidae and allies. Ericson *et al.* (2006b), in an overview of the Tyrannida, found Cotingidae to be sister to Pipridae, and Ohlson *et al.* (2007), with rather sparse sampling outside Cotingidae, found them in a polytomy with Pipridae, Tityridae, and Tyrannidae. Tello *et al.* (2009), with extensive sampling both within and outside the family, found Cotingidae sister to Tityridae, and Ohlson *et al.* (2013a), with similar sampling, found Cotingidae sister to a clade made up of Tityridae plus Tyrannidae. Clearly, consensus has not yet been achieved, but the three closest families are pretty clear. Relationships within Cotingidae were investigated extensively by Ohlson *et al.* (2007), but cotingids are also well represented in more-recent larger-scale analyses (see also Ohlson *et al.* 2013a, Tello *et al.* 2009), and Berv and Prum (2014) completed the most intensive and complete analysis yet. All these within-family analyses are consistent with the view that there are three to five natural groups within Cotingidae, and in our presentation of genera here, we follow the most recent five-group delineation (Berv & Prum 2014). It is important to note that the *Phytotoma* plantcutters, with their distinctive bills, have often been placed in their own family, but the phylogenetic evidence clearly shows that they belong in Cotingidae (Ohlson *et al.* 2007, Tello *et al.* 2009, Ohlson *et al.* 2013a, Berv & Prum 2014).



Andean Cock-of-the-rock, *Rupicola peruvianus*. Kosnipata Valley, eastern Andes, Peru. © Kevin Schafer.

## Subfamily PIPREOLINAE

*AMPELIOIDES*
1 species



*A. tschudii*
Scaled Fruiteater

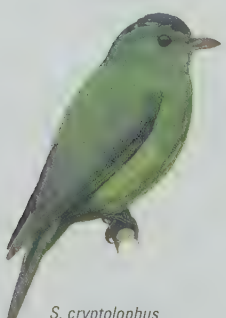
*PIPREOLA*
11 species



*P. riefferii*
Green-and-black Fruiteater

## Subfamily RUPICOLINAE

*SNOWORNIS*
2 species



*S. cryptolophus*
Olivaceous Piha

*CARPORNIS*
2 species



*C. cucullata*
Hooded Berryeater

*RUPICOLA*
2 species



*R. peruvianus*
Andean Cock-of-the-rock

*PHOENICIRCUS*
2 species



*P. nigricollis*
Black-necked Red Cotinga

## Subfamily PHYTOTOMINAE

*ZARATORNIS*
1 species



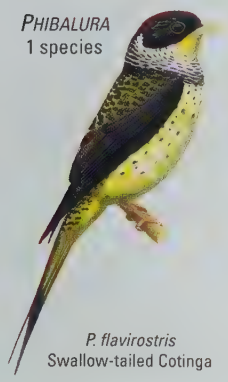
*Z. stresemanni*
White-cheeked Cotinga

*PHYTOTOMA*
3 species



*P. rutila*
White-tipped Plantcutter

*PHIBALURA*
1 species



*P. flavirostris*
Swallow-tailed Cotinga

*DOLIORNIS*
2 species



*D. sclateri*
Bay-vented Cotinga

*AMPELION*
2 species



*A. rufaxilla*
Chestnut-crested Cotinga

## Subfamily CEPHALOPTERINAE

*HAEMATODERUS*
1 species



*H. militaris*
Crimson Fruitcrow

*QUERULA*
1 species



*Q. purpurata*
Purple-throated Fruitcrow

*PYRODERUS*
1 species



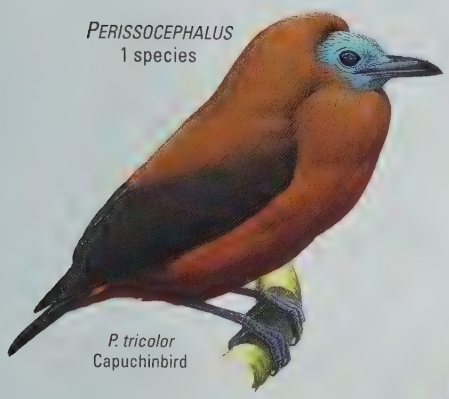
*P. scutatus*
Red-ruffed Fruitcrow

*CEPHALOPTERUS*
3 species



*C. penduliger*
Long-wattled Umbrellabird

*PERISSOCEPHALUS*
1 species



*P. tricolor*
Capuchinbird

## Subfamily COTINGINAE

*TIJUCA*
2 species



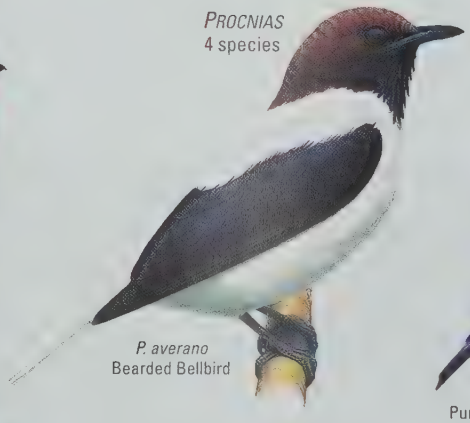
*T. atra*
Black-and-gold Cotinga

*LIPAUGUS*
7 species



*L. streptophorus*
Rose-collared Piha

*PROCNIAS*
4 species



*P. averano*
Bearded Bellbird

*COTINGA*
7 species



*C. cotinga*
Purple-breasted Cotinga

*PORPHYROLAEMA*
1 species



*P. porphyrolaema*
Purple-throated Cotinga

*CONIOPTILON*
1 species



*C. mcilhennyi*
Black-faced Cotinga

*GYMNODERUS*
1 species



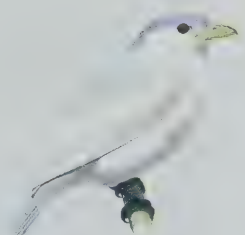
*G. foetidus*
Bare-necked Fruitcrow

*XIPHOLENA*
3 species



*X. punicea*
Pompadour Cotinga

*CARPODECTES*
3 species



*C. antoniae*
Yellow-billed Cotinga

# TITYRIDAE
## Tityras

11 genera • 38 species

**Related Families** Cotingidae (cotingas), Tyrannidae (tyrant flycatchers), Pipridae (manakins)

**Similar Birds** Cotingas (Cotingidae), tyrant flycatchers (Tyrannidae), monarch flycatchers (Monarchidae), butcherbirds (Cracticidae)

**Description**

- Plumage most often some mixture of white, gray, black, and brown
- Wings medium-long; tail short to medium-long, square
- Body small to medium, cylindrical ovoid, with upright posture
- Bill straight but typically heavy, often with a distinct hook
- Head medium to large; neck short, thick
- Legs short; feet small
- Males brighter and/or more boldly patterned than females

**Habitat** Tityras and their allies live in a wide variety of wooded habitats in the Neotropics, including dense tropical rainforest, cloud forest, and open, drier woodland at a range of elevations.

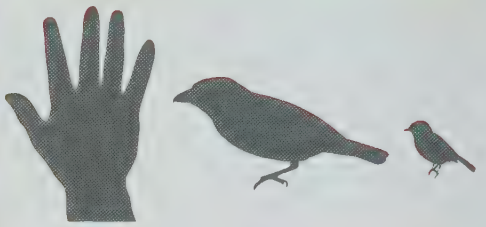
**Food** Tityrids are omnivorous, feeding on insects, small vertebrates, and fruits, with many species capturing their prey by sallying out from a perch.

**Breeding** All tityrid species whose breeding biology is known are monogamous with biparental care. Sharpbills *Oxyruncus cristatus* may be polygynous with a lek breeding system, but this remains unclear. Tityras predominantly nest in cavities, which they line with dead leaves, twigs, and rootlets. Becards, by contrast, build large, spherical nests in trees, similar to the pendulous nests of *Onychorhynchus* and *Myiobius*. These large globular nests have a side entrance and often consist of two layers, with an inner chamber surrounded by a coarser outer layer. Different still, *Schiffornis* and Sharpbills construct open cup nests. Females lay 2 to 4, rarely 5, eggs. In most species, both members of the pair contribute to parental care, although females alone incubate. Incubation takes 18 to 21 days, and the chicks fledge after 20 to 30 days in the nest.

**Conservation** Habitat loss is the major threat for two species (5%) of tityrids (1 NT, 1 EN). The endangered Slaty Becard *Pachyramphus spodiurus*, an endemic of lowland forests in northwestern Peru and Ecuador, has suffered from deforestation, habitat fragmentation, and the destruction of understory cover through grazing of livestock. The Buff-throated Purpletuft *Iodopleura pipra* lives in a small area of Atlantic Forest in eastern Brazil, and is similarly threatened by deforestation.



Black-crowned Tityra, *Tityra inquisitor*.
Reserva Las Brisas, Limon, Costa Rica. © Alex Vargas.





The tityrids are a group of Neotropical songbirds that are so morphologically diverse that few observers would place them together on the basis of their overall morphology. Indeed, most in this family look like they might better be placed elsewhere: some recall flycatchers, others cotingas, and yet others manakins. Still, recent molecular analyses consistently place this sampler and grab-bag of Neotropical suboscine diversity together, and distinct from, the other groups in this huge radiation. Although all are upright, large-headed, with white, gray, black, and brown predominating in their plumages, this group contains species as varied as the butcherbird-like tityras, the manakin-like *Schiffornis*, the small, compact purpletufts, and the outlandish Royal Flycatcher, among many others.



Rose-throated Becard, *Pachyramphus aglaiae*. Punta Leona Resort, Jaco, Costa Rica. © Alex Vargas.

**Relationships** The species that make up the current Tityridae have been notoriously difficult to place taxonomically. Many of these birds have been classified previously as members of Cotingidae or Tyrannidae. Molecular evidence has sometimes been conflicting, but all recent studies show Tityridae to be a monophyletic group that is outside both Tyrannidae and Cotingidae (Chesser 2004, Ericson *et al.* 2006b, Tello *et al.* 2009, Ohlson *et al.* 2013a). Several recent investigations of these relationships have proposed a variety of sister relationships—between the Tityridae and Pipridae, or Tyrannidae, or Cotingidae (Chesser 2004, Ericson *et al.* 2006b, Tello *et al.* 2009, Ohlson *et al.* 2012, 2013a). The most recent studies, both of which include extensive taxon sampling, place the Tityridae as sister to Cotingidae (Tello *et al.* 2009) or Tyrannidae (Ericson *et al.* 2006b, Ohlson *et al.* 2012, 2013a). The species-level relationships in this family are still imperfectly known (Barber & Rice 2007, Tello *et al.* 2009, Ohlson *et al.* 2013a), but the following groups seem to hold up in recent studies. The tityras and becards are sister taxa and include the monotypic genus *Xenopsaris* belonging with the becards; *Laniocera* mourners, *Schiffornis* species, and the monotypic *Laniisoma* appear to form a clade together; and the flycatchers in the genera *Onychorhynchus*, *Terenotriccus*, and *Myiobius* seem to form a natural clade, which seems to be sister to the Sharpbill *Oxyruncus cristatus*. Many of these relationships are still to be resolved more conclusively, and we have opted to recognize fewer families in the Tyrannida than others have recently done (cf. Cracraft 2014).

## Subfamily **Oxyruncinae**

*OXYRUNCUS*
1 species



*O. cristatus*
Sharpbill

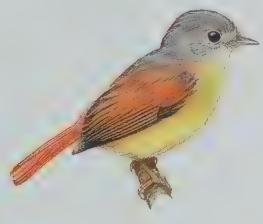
## Subfamily **Onychorynchinae**

*ONYCHORHYNCHUS*
1 species



*O. coronatus*
Royal Flycatcher

*TERENOTRICCUS*
1 species



*T. erythrurus*
Ruddy-tailed Flycatcher

*MYIOBIUS*
4 species



*M. villosus*
Tawny-breasted Flycatcher

## Subfamily **Tityrinae**
## Tribe **Tityrini**

*IODOPLEURA*
3 species



*I. isabellae*
White-browed Purpletuft

*TITYRA*
4 species



*T. semifasciata*
Masked Tityra

*XENOPSARIS*
1 species



*X. albinucha*
White-naped Xenopsaris

*PACHYRAMPHUS*
17 species



*P. xanthogenys*
Yellow-cheeked Becard

*SCHIFFORNIS*
3 species



*S. virescens*
Greenish Mourner

## Tribe **Ptilochlorini**

*LANIOCERA*
2 species



*L. hypopyrra*
Cinereous Mourner

*LANIISOMA*
1 species



*L. elegans*
Elegant Mourner

# TYRANNIDAE
## Tyrant Flycatchers

101 genera • 410 species

**Related Families** Tityridae (tityras), Cotingidae (cotingas)

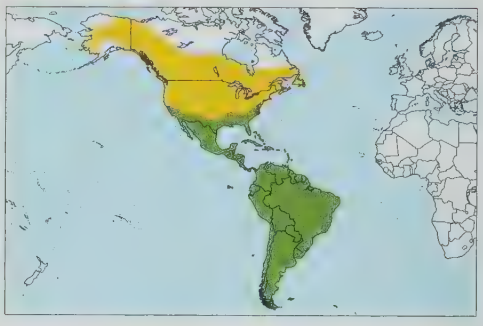
**Similar Birds** Other flycatchers (Muscicapidae, Monarchidae, Stenostiridae, Tityridae)

**Description**
- Plumage often relatively dull, with olive-browns and yellows dominant
- Wings medium length, rounded to pointed; tail most often medium to long, truncate
- Body very small to medium, cylindrical ovoid, with upright posture
- Bill typically broad, flat, slightly hooked, usually with a ridge on the culmen, most with rictal bristles
- Head large; neck short, thick
- Legs and toes generally short
- Sexes similar in most species



Many-colored Rush Tyrant, *Tachuris rubrigastra*. Junín, Peru. © Dubi Shapiro.





**Habitat** The tyrant flycatchers live in a wide range of habitats from open grasslands and savanna, alpine tundra, and coastal environments, to scrub and the full array of forest habitats.

**Food** Tyrannids feed primarily on insects and other invertebrates, although fruits are also eaten at least occasionally by virtually all species; some species adjust the diet seasonally, insectivorous when breeding, but often foraging on fruit the rest of the year. Many larger species of tyrannids include small vertebrates in their diets. Typical flycatchers forage by sallying from open perches, capturing prey in the air or from an exposed leaf or branch, or swooping down for those on the ground or water. Other species glean insects from branches and leaves, and ground species search for and subdue prey there.

**Breeding** The tyrant flycatchers are primarily monogamous with biparental care, although a few species are polygynous with female parental care. At least one species, Ochre-bellied Flycatcher *Mionectes oleagineus*, has a lek mating system with diffuse leks of as many as six males displaying at once. Most species build open cup, globular, or domed nests placed in tree branches, on cliff faces, or on the ground; a few species are cavity-nesters, using either natural or artificial cavities. Nests are typically constructed of grass, twigs, and other vegetation, although hair, fur, snake skins, and other materials may also be used. Piratic Flycatcher *Legatus leucophaius* does not build a nest of its own, instead appropriating the nests of other species

Tyrannidae is the most speciose bird family and one of the three main branches of passerine diversity in the Neotropics. Many genera have diversified into large numbers of very similar species that pose a challenge in field identification. Most have large heads with at least the suggestion of a regal crest, long tails, upright posture, and a hint of yellow or green in their plumage. Exceptions to this rule include some enchanting all white, all black, or even scarlet birds; others with bizarre or very long tail feathers; and still others whose morphologies have evolved into forms that are convergent with todies, shrikes, thrushes, or tits. No matter their form, they are generally energetic sallying insectivores.



Brown-backed Chat Tyrant, *Ochthoeca fumicolor*. Abra Malaga Pass, Peru. © Mark A. Chappell.

by harassing the builders until they abandon them. Female tyrannids lay 1 to 7 eggs and are typically responsible for building the nest, incubating the eggs, and brooding the chicks. Incubation most often takes 12 to 16 days. Both male and female feed the chicks, and the chicks usually fledge after 14 to 17 days in the nest. Fledglings are still fed and attended by the parents for weeks, and, in resident species, the young of the previous year often do not leave the parental territory until shortly before the next breeding season commences.

**Conservation** Habitat loss is the major threat for the 80 tyrannid species (20%) that are of conservation concern (50 NT, 18 VU, 11 EN, 1 CR). The Kinglet Calyptura *Calyptura cristata* of southeast Brazil, which was until recently considered a cotingid, is critically endangered. Following its description in the mid-1800's, the species was not seen again until the 1990's. Since that time, it has not reliably been seen again, and if still extant, it is exceedingly rare with a minuscule range. The endangered Giant Kingbird *Tyrannus cubensis* of Cuba, Rufous Flycatcher *Myiarchus semirufus* of the Tumbes region of Peru, and several species of *Phylloscartes* tyrannulets, three of which are restricted to very small areas of Brazil, all exemplify the double threat posed by habitat degradation coupled with tiny ranges and populations.

**Relationships** Tyrannidae is part of the parvorder Tyrannida of the New World suboscine radiation. The limits of Tyrannidae, as with several other Neotropical suboscine families, have been difficult to determine (Lanyon 1985), though recent molecular phylogenetic studies have improved our understanding. Chesser (2004) placed Tyrannidae in a polytomy with Pipridae, Tityridae, and Cotingidae. Ericson *et al.* (2006), along with studies by Ohlson *et al.* (2012, 2013a), found Tyrannidae sister to Tityridae, with those two taken together in turn sister to Cotingidae and Pipridae, whereas Tello *et al.* (2009) found Tyrannidae to be sister to a clade formed of Cotingidae and Tityridae taken together. Within Tyrannidae, both Tello *et al.* (2009) and Ohlson *et al.* (2013a) found several distinct, well-supported groups, some of which have been split off and recognized by others as distinct families (see Cracraft 2014). On the basis of clades following Tello *et al.* (2009) and Ohlson *et al.* (2013a) the groups and relationships in the family can be outlined thus: a collection of four subfamilies forms a well-supported clade in a ladderized phylogeny in which Platyrinchinae, then Pipritinae, and then Tachuridinae are each successively sister to the largest subfamily in the group, Pipromorphinae. This clade of four subfamilies is then sister to the remaining, "typical," tyrant flycatchers. Within those typical tyrant flycatchers, there are several well-supported and recognized subfamilies, though the relationships among them are not yet well resolved. It seems likely that the large and diverse Fluvicolinae is sister to Tyranninae and that Elaeniinae may be sister to Hirundineinae. The Short-tailed Field Tyrant *Muscigralla brevicauda* seems to merit monophyletic subfamily status on its own (Ohlson *et al.* 2013a), sister to the clade made up of Tyranninae and Fluvicolinae (Tello *et al.* 2009).



Common Tody-Flycatcher, *Todirostrum cinereum*. Gamboa, Panama. © Brian Magnier.

Subfamily **Platyrinchinae**

*CALYPTURA*
1 species



*C. cristata*
Kinglet Calyptura

*NEOPIPO*
1 species



*N. cinnamomea*
Cinnamon Tyrant

*PLATYRINCHUS*
7 species



*P. mystaceus*
White-throated Spadebill

Subfamily **Pipritinae**

*PIPRITES*
3 species



*P. chloris*
Wing-barred Piprites

Subfamily **Tachuridinae**

*TACHURIS*
1 species



*T. rubrigastra*
Many-colored Rush Tyrant

## Subfamily **Pipromorphinae**

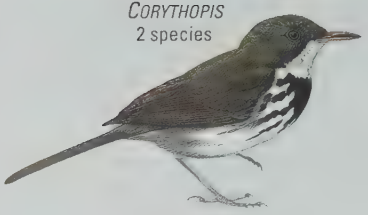
### Tribe **Pipromorphini**

*Pseudotriccus*
3 species



*P. ruficeps*
Rufous-headed Pygmy-Tyrant

*Corythopis*
2 species



*C. torquatus*
Ringed Antpipit

*Phylloscartes*
16 species



*P. flaviventris*
Rufous-lored Tyrannulet

*Pogonotriccus*
7 species



*P. poecilotis*
Variegated Bristle-Tyrant

*Mionectes*
5 species



*M. oleagineus*
Ochre-bellied Flycatcher

*Leptopogon*
4 species



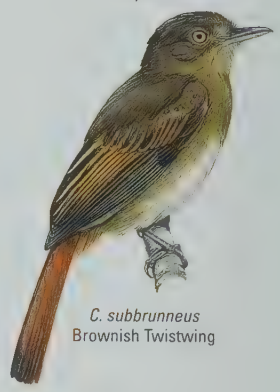
*L. rufipectus*
Rufous-breasted Flycatcher

*Taeniotriccus*
1 species



*T. andrei*
Black-chested Tyrant

*Cnipodectes*
2 species



*C. subbrunneus*
Brownish Twistwing

### Tribe **Rhynchocyclini**

*Rhynchocyclus*
[illegible] species



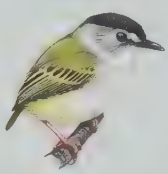
*R. brevirostris*
Eye-ringed Flatbill

*Tolmomyias*
6 species



*T. flaviventris*
Yellow-breasted Flycatcher

*Myiornis*
4 species



*M. atricapillus*
Black-capped Pygmy-Tyrant

### Tribe **Triccini**

*Oncostoma*
2 species



*O. cinereigulare*
Northern Bentbill

*Lophotriccus*
4 species



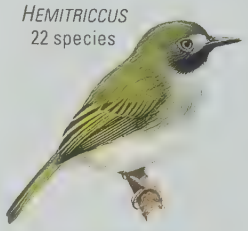
*L. eulophotes*
Long-crested Pygmy-Tyrant

*Atalotriccus*
1 species



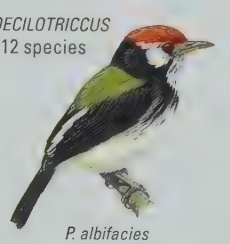
*A. pilaris*
Pale-eyed Pygmy-Tyrant

*Hemitriccus*
22 species



*H. granadensis*
Black-throated Tody-Tyrant

*Poecilotriccus*
12 species



*P. albifacies*
White-cheeked Tody-Tyrant

*Todirostrum*
7 species



*T. cinereum*
Common Tody-Flycatcher

*Myiotriccus*
1 species



*M. ornatus*
Ornate Flycatcher

## Subfamily **Hirundineinae**

*Nephelomyias*
3 species



*N. pulcher*
Handsome Flycatcher

*Pyrrhomyias*
1 species



*P. cinnamomeus*
Cinnamon Flycatcher

*Hirundinea*
1 species

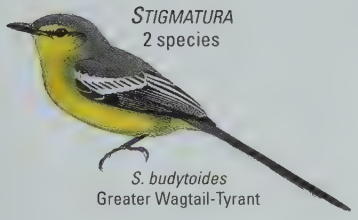


*H. ferruginea*
Cliff Flycatcher

## Subfamily **Elaeniinae**

### Tribe **Euscarthmini**

*Stigmatura*
2 species



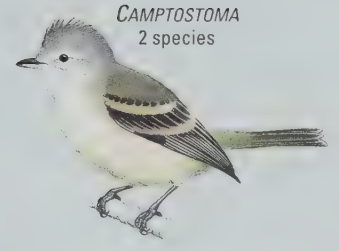
*S. budytoides*
Greater Wagtail-Tyrant

*Euscarthmus*
2 species



*E. meloryphus*
Tawny-crowned Pygmy-Tyrant

*Camptostoma*
2 species



*C. obsoletum*
Southern Beardless Tyrannulet

*Ornithion*
3 species



*O. brunneicapillus*
Brown-capped Tyrannulet

*Zimmerius*
9 species



*Z. cinereicapilla*
Red-billed Tyrannulet

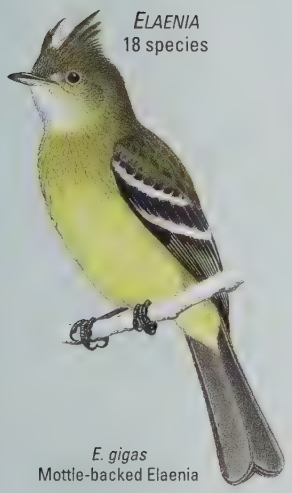
*Inezia*
4 species



*I. caudata*
Pale-tipped Tyrannulet

### Tribe **Elaeniini**

*Elaenia*
18 species



*E. gigas*
Mottle-backed Elaenia

*Tyrannulus*
1 species



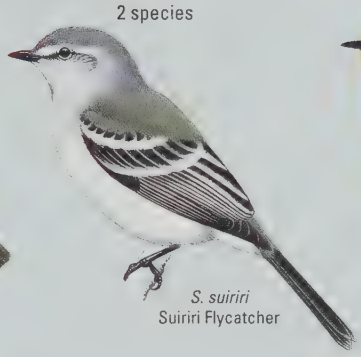
*T. elatus*
Yellow-crowned Tyrannulet

*Myiopagis*
7 species



*M. caniceps*
Gray Elaenia

*Suiriri*
2 species



*S. suiriri*
Suiriri Flycatcher

*Capsiempis*
1 species



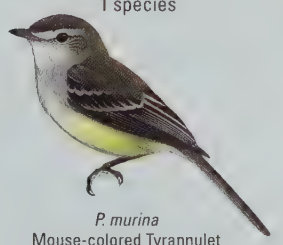
*C. flaveola*
Yellow Tyrannulet

*Phyllomyias*
13 species



*P. burmeisteri*
Rough-legged Tyrannulet

*Phaeomyias*
1 species



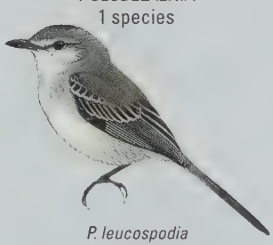
*P. murina*
Mouse-colored Tyrannulet

*Nesotriccus*
1 species



*N. ridgwayi*
Cocos Flycatcher

*Pseudelaenia*
1 species



*P. leucospodia*
Gray-and-white Tyrannulet

*Mecocerculus*
6 species



*M. calopterus*
Rufous-winged Tyrannulet

*Anairetes*
6 species



*A. nigrocristatus*
Black-crested Tit-Tyrant

*Polystictus*
2 species



*P. pectoralis*
Bearded Tachuri

*Culicivora*
1 species



*C. caudacuta*
Sharp-tailed Tyrant

*Pseudocolopteryx*
4 species



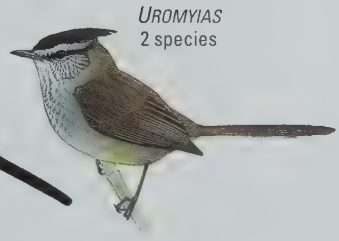
*P. flaviventris*
Warbling Doradito

*Serpophaga*
6 species



*S. cinerea*
Torrent Tyrannulet

*Uromyias*
2 species



*U. agraphia*
Unstreaked Tit-Tyrant

*MUSCIGRALLA*
1 species



*M. brevicauda*
Short-tailed Field-Tyrant

*ATTILA*
7 species



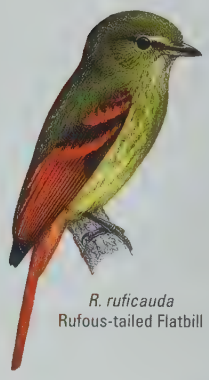
*A. rufus*
Gray-hooded Attila

*LEGATUS*
1 species



*L. leucophaius*
Piratic Flycatcher

*RAMPHOTRIGON*
3 species



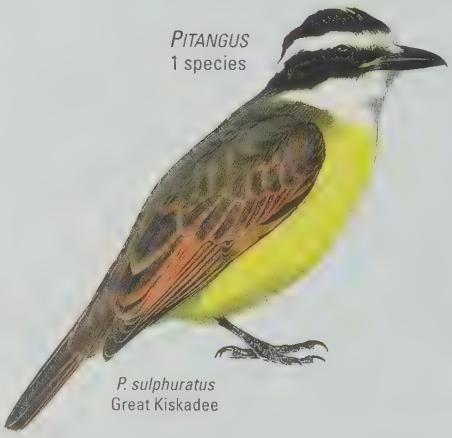
*R. ruficauda*
Rufous-tailed Flatbill

*DELTARHYNCHUS*
1 species



*D. flammulatus*
Flammulated Flycatcher

*PITANGUS*
1 species



*P. sulphuratus*
Great Kiskadee

*PHILOHYDOR*
1 species



*P. lictor*
Lesser Kiskadee

*MACHETORNIS*
1 species



*M. rixosa*
Cattle Tyrant

*TYRANNOPSIS*
1 species



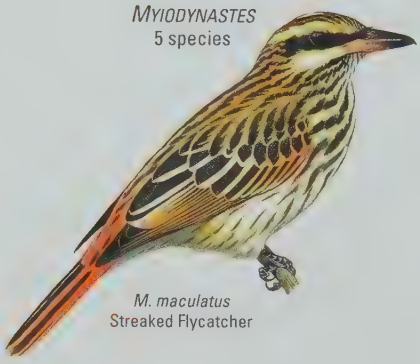
*T. sulphurea*
Sulphury Flycatcher

*MEGARYNCHUS*
1 species



*M. pitangua*
Boat-billed Flycatcher

*MYIODYNASTES*
5 species



*M. maculatus*
Streaked Flycatcher

*MYIOZETETES*
4 species



*M. cayanensis*
Rusty-margined Flycatcher

*CONOPIAS*
4 species



*C. trivirgatus*
Three-striped Flycatcher

*PHELPSIA*
1 species



*P. inornata*
White-bearded Flycatcher

*EMPIDONOMUS*
1 species



*E. varius*
Variegated Flycatcher

*GRISEOTYRANNUS*
1 species



*G. aurantioatrocristatus*
Crowned Slaty Flycatcher

*TYRANNUS*
13 species

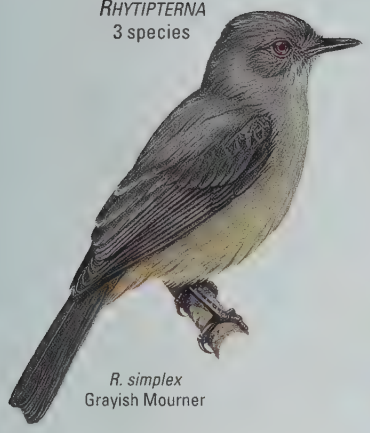


*T. melancholicus*
Tropical Kingbird

## Subfamily **Tyranninae (2 of 2)**

### Tribe **Myiarchini**

*RHYTIPTERNA*
3 species



*R. simplex*
Grayish Mourner

*CASIORNIS*
2 species



*C. rufus*
Rufous Casiornis

*SIRYSTES*
1 species



*S. sibilator*
Sirystes

*MYIARCHUS*
22 species

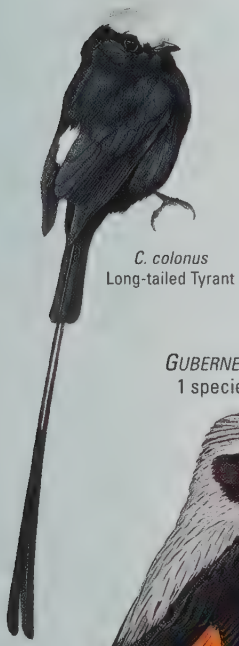


*M. tyrannulus*
Brown-crested Flycatcher

## Subfamily **Fluvicolinae (1 of 2)**

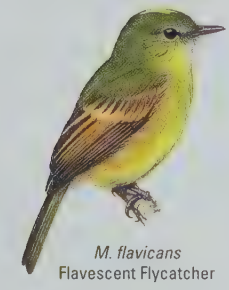
### Tribe **Fluvicolini**

*COLONIA*
1 species



*C. colonus*
Long-tailed Tyrant

*MYIOPHOBUS*
6 species



*M. flavicans*
Flavescent Flycatcher

*SILVICULTRIX*
4 species



*S. pulchella*
Golden-browed Chat-Tyrant

*COLORHAMPHUS*
1 species



*C. parvirostris*
Patagonian Tyrant

*OCHTHOECA*
7 species



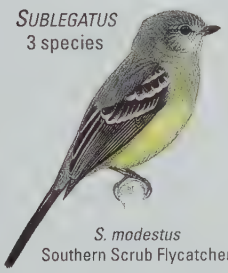
*O. rufipectoralis*
Rufous-breasted Chat-Tyrant

*GUBERNETES*
1 species



*G. yetapa*
Streamer-tailed Tyrant

*SUBLEGATUS*
3 species



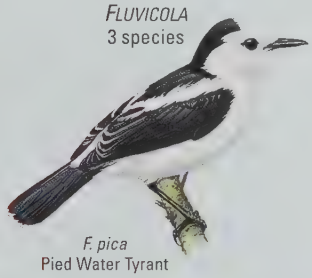
*S. modestus*
Southern Scrub Flycatcher

*PYROCEPHALUS*
1 species



*P. rubinus*
Vermilion Flycatcher

*FLUVICOLA*
3 species



*F. pica*
Pied Water Tyrant

*ARUNDINICOLA*
1 species



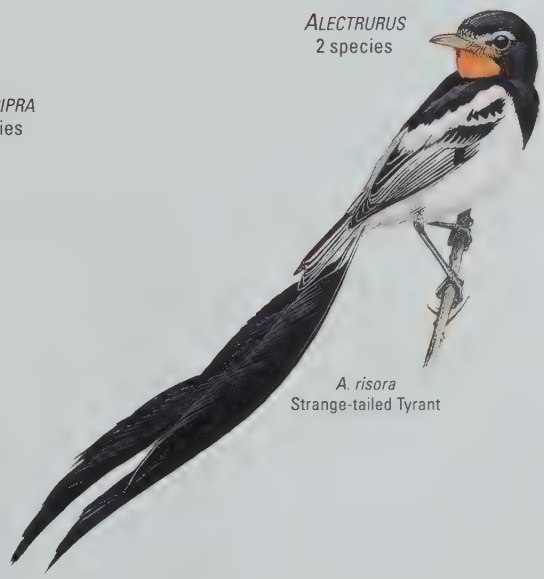
*A. leucocephala*
White-headed Marsh Tyrant

*MUSCIPIPRA*
1 species



*M. vetula*
Shear-tailed Gray Tyrant

*ALECTRURUS*
2 species



*A. risora*
Strange-tailed Tyrant

## Tribe **Xolmiini**

*Lessonia*
2 species



*L. rufa*
Austral Negrito

*Hymenops*
1 species



*H. perspicillatus*
Spectacled Tyrant

*Knipolegus*
10 species



*K. aterrimus*
White-winged Black Tyrant

*Satrapa*
1 species



*S. icterophrys*
Yellow-browed Tyrant

*Muscisaxicola*
13 species



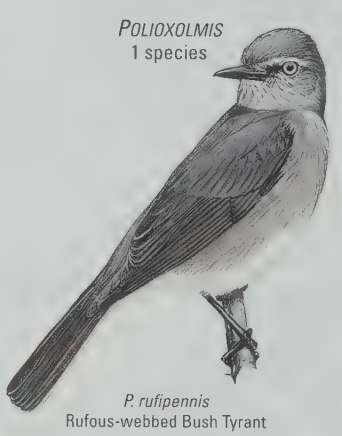
*M. rufivertex*
Rufous-naped Ground Tyrant

*Cnemarchus*
1 species



*C. erythropygius*
Red-rumped Bush Tyrant

*Polioxolmis*
1 species



*P. rufipennis*
Rufous-webbed Bush Tyrant

*Xolmis*
8 species



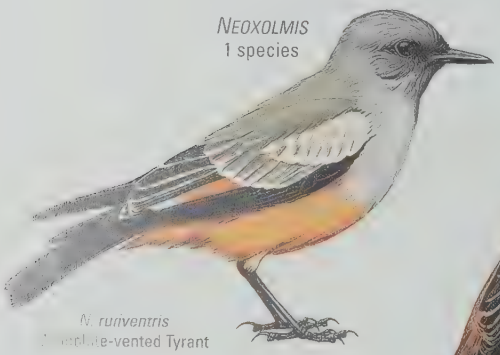
*X. irupero*
White Monjita

*Agriornis*
5 species



*A. montanus*
Black-billed Shrike-Tyrant

*Neoxolmis*
1 species



*N. rufiventris*
Rufous-vented Tyrant

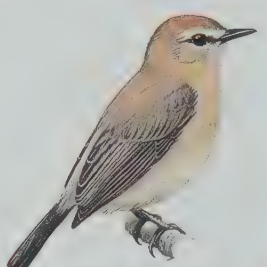
*Myiotheretes*
4 species



*M. striaticollis*
Streak-throated Bush Tyrant

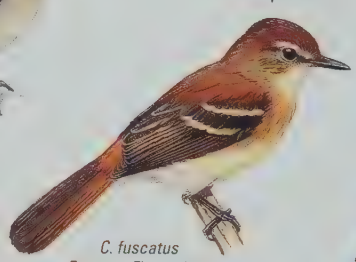
## Tribe **Contopini**

*Ochthornis*
1 species



*O. littoralis*
Drab Water Tyrant

*Cnemotriccus*
1 species



*C. fuscatus*
Fuscous Flycatcher

*Aphanotriccus*
2 species



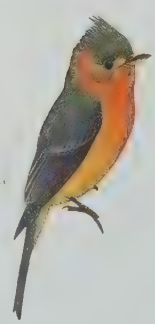
*A. capitalis*
Tawny-chested Flycatcher

*Lathrotriccus*
2 species



*L. euleri*
Euler's Flycatcher

*Mitrephanes*
2 species



*M. phaeocercus*
Tufted Flycatcher

*Sayornis*
3 species



*S. nigricans*
Black Phoebe

*Empidonax*
15 species



*E. minimus*
Least Flycatcher

*Contopus*
14 species



*C. cinereus*
Tropical Pewee

*Xenotriccus*
2 species



*X. callizonus*
Belted Flycatcher

# Order: Passeriformes, "Basal Oscines"

## Families: Menuridae, Atrichornithidae, Ptilonorhynchidae, Climacteridae, Maluridae, Dasyornithidae, Meliphagidae, Pardalotidae, Acanthizidae, Orthonychidae, Pomatostomidae

Most of the oscine passerines, otherwise known as suborder Passeri, fall within one of eight main superfamilies, but there are 11 families, which we call the "basal oscines" (after Jønsson *et al.* 2011), lying at the base of the oscine tree, with each family or small group of families successively sister to the rest of the oscines. We use quotation marks for the "basal oscines" to emphasize the fact that this is not a natural monophyletic group (see more detailed discussion of this issue in *Phylogenies and Avian Classification* in the Introduction). And note that the word "basal" in the name of this group does not imply anything primitive or ancestral about these birds, only that their lineages branched early from the oscine tree and did not lead to large diversifications that survived to the present day. Moving up the tree from its base, these families include the lyrebirds and scrub-birds, bowerbirds, Australasian treecreepers, honeyeaters and their allies (the "meliphagoids" see below), logrunners, and Australasian babblers (Barker *et al.* 2004, Chesser & Have 2007, Driskell *et al.* 2007, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014, Barker 2014, Cracraft 2014). Among the "basal oscines" is a well-supported clade (consisting of Maluridae, Dasyornithidae, Meliphagidae, Pardalotidae, and Acanthizidae) that many authors recognize as the superfamily Meliphagoidea (Gardner *et al.* 2010) or the infraorder Meliphagides (Cracraft 2014). This well-supported clade falls within the series of "basal oscine" clades that are successively sister to the rest of the oscine radiation. Within the meliphagoids, there appears to be an unbalanced phylogeny, with the fairywrens sister to the rest, which are then branched off by bristlebirds, then honeyeaters, pardalotes, and finally thornbills (Gardner *et al.* 2010). However, at a broader scale, relationships among all the "basal oscine" families are not well resolved, as most studies to date do not include representatives of all these taxa.



Superb Lyrebird, *Menura novaehollandiae*. Sherbrooke Forest, Dandenong Ranges NP, Australia. © Alex C. Maisey.

# MENURIDAE
## Lyrebirds

1 genus • 2 species

**Related Families** Atrichornithidae (scrub-birds)

**Similar Birds** Pheasants (Phasianidae), chachalacas (Cracidae)

**Description**
- Plumage generally dull gray-brown
- Wings short, rounded; tail long
- Body large, ovoid, with horizontal posture
- Bill medium length, conical, and sharp
- Head small, with bare bluish orbital skin; neck medium-long
- Legs long; toes long and stout with long near-straight claws
- Sexually dimorphic; males with highly modified rectrices

**Habitat** Lyrebirds live on the floor of wet forests in eastern Australia.

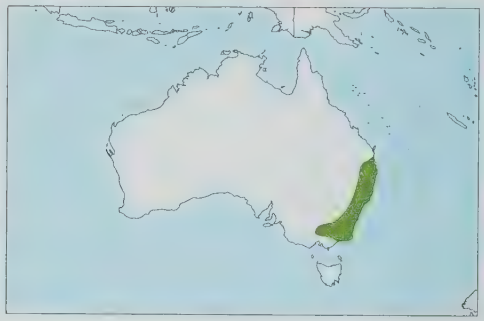
**Food** Lyrebirds feed mainly on invertebrates, but also take small vertebrates such as lizards and frogs. They mostly forage in the soil, but occasionally they scratch among the debris trapped in epiphytic ferns. In foraging, they turn over large volumes of surface soil and leaf litter, greatly influencing the cycling of nutrients in the rainforest ecosystem.

**Breeding** Lyrebirds are polygynous, with a single male's territory potentially incorporating several female territories. Males have one of the most diverse vocal repertoires of any bird, and they are able to mimic many bird species and, famously, anthropogenic noises. When a female approaches a male lyrebird's display site, a dirt mound on the forest floor, he performs an elaborate courtship dance involving his highly modified tail feathers, which, if successful, results in copulation. Lyrebird nests are domed structures placed on the ground or, less commonly, in low tree branches. The base of the nest is constructed with coarse twigs, while the sides and roof are constructed of finer materials. Females lay 1 egg. Only the female provides care, incubating, brooding, and feeding the single chick. Incubation and nestling periods are particularly long, about 50 days for each, likely due to extended (and poorly understood) periods when the female is not incubating or feeding the chick. Lyrebird fledglings may stay with the female for eight to nine months after leaving the nest.



Superb Lyrebird, *Menura novaehollandiae*. Sherbrooke Forest, Dandenong Ranges NP, Australia. © Alex C. Maisey.





**Conservation** Habitat degradation threatens one species (50%) of lyrebird (1 NT). The Albert's Lyrebird *Menura alberti* has a small range, and has experienced declines related to the introduction of non-native plant species.

**Relationships** Menuridae forms part of the oscine passerine radiation, but does not fall within any of its major superfamily subgroups. Instead, this family represents a divergent lineage that is likely sister to Atrichornithidae (Chesser & Have 2007, Jønsson *et al.* 2011), and these taken together are likely sister to all other oscine passerines (Barker *et al.* 2004, Fuchs *et al.* 2006c, Jønsson *et al.* 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2008b, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014, Barker 2014).

The lyrebirds are among the world's largest passerines, looking and acting much more like brown pheasants than like their songbird relatives. This illusion is shattered when male lyrebirds open their mouths to sing. Lyrebirds are among the best mimics in the world, sometimes incorporating human-made sounds (the sounds of chainsaws, a can of spray paint being shaken, camera clicks, and, of course, cellphone rings) into their epically long song phrases. When not singing, lyrebirds walk quietly through the wet forests of eastern Australia, stopping often to scratch in the forest duff with their long, strong legs in search of grubs. Their name derives from the shape of the spectacular tail plumes of the displaying male.



Superb Lyrebird, *Menura novaehollandiae*. Sherbrooke Forest, Dandenong Ranges NP, Australia. © Alex C. Maisey.

*MENURA*
2 species



*M. alberti*
Albert's Lyrebird

Passeriformes, "Basal Oscines"

# ATRICHORNITHIDAE
## Scrub-birds

1 genus • 2 species

**Related Families** Menuridae (lyrebirds)

**Similar Birds** Bristlebirds (Dasyornithidae), tapaculos (Rhinocryptidae)

**Description**
- Plumage brown, with barring on the wings, tail, and flanks
- Wings short, rounded; tail long, broad, graduated
- Body medium-small, flattened cylindrical, with horizontal posture
- Bill medium-short deep, and wedge-shaped with straight culmen
- Head medium-sized; neck short, thick
- Legs medium-long; feet large
- Sexes similar

**Habitat** Scrub-birds live in dense undergrowth: the Rufous Scrub-bird *Atrichornis rufescens* frequents the understory of humid *Nothofagus* forests in the east, whereas the Noisy Scrub-bird *A. clamosus* lives in the dense understory of low scrubby forest in the west. Both species require habitat that contains a deep layer of leaf litter, restricting them to areas that have remained unburned for at least ten years, often near streams.

**Food** Scrub-birds feed primarily on ants, beetles, spiders, and other invertebrates in the dense leaf litter characteristic of their habitat.

**Breeding** Scrub-birds are thought to be polygynous with female parental care. The nest, of long grass and sedge leaves, is a globular structure with a side entrance that is built on a sedge clump or in a dense shrub; the nest is lined at least in part by a cardboard-like matting of wood fiber. These birds breed in the austral winter in the coldest months of the year. Females appear to lay clutches of 1 egg in *A. clamosus* and 2 eggs in *A. rufescens*. Only the female is active in nest construction, incubation, and feeding the chick. Many details of nesting are unknown for *A. rufescens*, but in *A. clamosus* the incubation period is an exceptionally long five to six weeks, and the chick leaves the nest at three to four weeks post-hatch, but stays with its mother up to six months after fledging.



Noisy Scrub-bird, *Atrichornis clamosus*.
Cheynes Beach, Western Australia. © Rohan Clarke.

**Conservation** Habitat destruction due to fire is the primary conservation concern for the two species (100%) of atrichornithids (2 EN). Although the populations of both species have stabilized, they are still at risk of further habitat destruction. Careful study of the life histories of both species has led to fire management regimes that benefit their strict foraging requirements.

**Relationships** Atrichornithidae is part of an ancient lineage of the oscine passerines. Few molecular phylogenetic studies have sampled this family, but the available morphological and molecular evidence strongly supports its sister relationship to Menuridae (Sibley & Ahlquist 1990, Raikow & Bledsoe 2000, Chesser & Have 2007, Jønsson *et al.* 2011). In the past, the scrub-birds have sometimes been grouped as part of an expanded Menuridae, along with Ptilonorhynchidae and Climacteridae (Sibley & Ahlquist 1990, Raikow & Bledsoe 2000).



These denizens of the dense scrubby vegetation that occurs in small areas on the eastern and western fringes of Australia are masters of concealment. Many birders have spent hours listening to one of these birds singing only feet away without even glimpsing it momentarily. Their laterally compressed bodies, reminiscent of some rails, allow them to slink through the undergrowth with ease as well as make them exceedingly difficult to capture in nets. The few lucky observers who have actually seen these birds likely saw them running, with tail raised tapaculo-like, across a road or break in the shrubbery. Scrub-birds appear to be the only passerines to lack a furcula, which is otherwise almost omnipresent in birds.



Noisy Scrub-bird, *Atrichornis clamosus*. Two Peoples Bay, Western Australia. © Graeme Chapman.

*ATRICHORNIS*
2 species



*A. rufescens*
Rufous Scrub-bird

# PTILONORHYNCHIDAE

Bowerbirds

8 genera • 20 species

**Related Families** Climacteridae (Australian treecreepers)

**Resemble** Starlings and mynas (Sturnidae), cotingas (Cotingidae), satinbirds (Cnemophilidae)

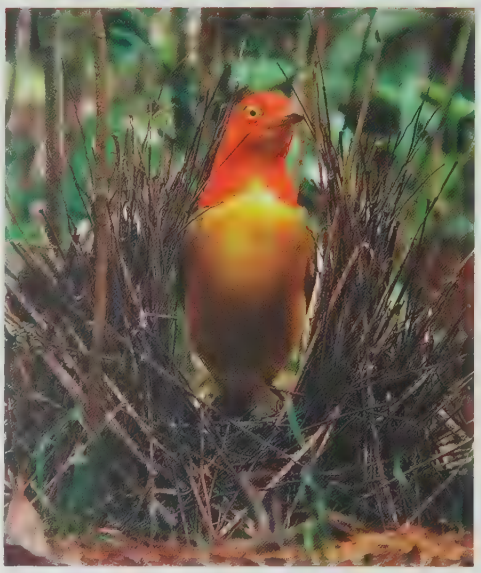
**Description**

- Plumage brown, black (iridescent blue-black in one) or green, some with bright yellow or orange in small or large part
- Wings short to medium, rounded; tail short to medium
- Body medium-sized, cylindrical ovoid
- Bill medium length, stout, with feathered nostrils
- Head medium to large; neck short, thick
- Legs medium-short; feet large
- Males usually more colorful than females

**Habitat** Most ptilonorhynchids live in tropical rainforests of New Guinea and Australia. Some of the Australian bowerbirds occupy edge habitat near rainforests, but *Chlamydera* species live in drier forests and woodlands, even extending into near-desert environments.

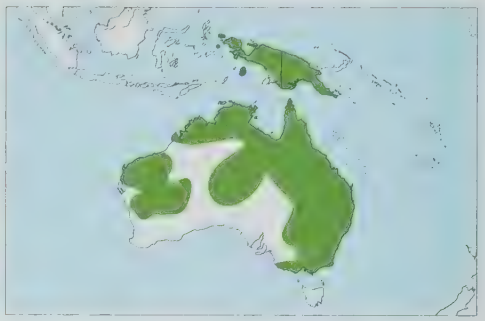
**Food** Bowerbirds feed on a wide variety of foods, but for many species, fruits make up the majority of their diet. *Ailuroedus* catbirds rely heavily on figs (*Ficus*), and bowerbirds rely on a variety of fruits that are typically highly dispersed within their territories. Other plant material, including leaves, nectar, and flowers, is also eaten. Arthropods make up a significant portion of their diet during certain times of the year, especially for chicks and young birds. Small vertebrates, like lizards and frogs, are also sometimes taken.

**Breeding** Within the Ptilonorhynchidae, there are two breeding strategies: the catbirds are monogamous with biparental care, whereas the bowerbirds are polygynous. Bowerbirds are best known for the bowers they construct to attract females. Bowers can be divided into two main categories: avenue bowers, which consist of two parallel walls constructed of sticks and grass, and maypole bowers, which are more variable, and range from an elaborate hut to a column of sticks built in the middle of a court. Some bowerbirds do not construct an actual bower, but instead maintain only a court that they decorate. All bowerbirds decorate their constructions with diverse materials, including colorful fruit, flowers, leaves, stones, fungi, and a variety of human debris (e.g., pens, clothes-pins,



Flame Bowerbird, *Sericulus ardens*.
Near Elevala River, Papua New Guinea. © Nick Athanas.





Like the birds-of-paradise, their somewhat distantly related neighbors in Australo-Papuan forests, members of this family exemplify the whimsy of sexual selection run rampant. Male bowerbirds have adopted a distinctive dimension for the expression of their ardor, all building a bower that serves to attract, and later, to woo, prospective mates. Decorated with blossoms, fruits, snake skins, bottle caps, or bits of plastic, all in the color or colors preferred by females of each species, these bowers are exquisite creations that require great effort to produce, maintain, and defend. The fact that the largest and most spectacular of these arbors are made by species with the drabbest males suggests compensatory adjustment between plumage brightness and bower complexity, and intense sexual selection in all.



Satin Bowerbird, *Ptilonorhynchus violaceus*. Wollongong, New South Wales, Australia. © Mark A. Chappell.

straws), and often arrange these items into neat piles. Females are believed to judge male quality by the number of decorations and the rarity of items that are present. Ptilonorhynchid nests are open cups of variable complexity placed in bushes or tree forks, most nests consisting of an outer stick layer surrounding an inner layer of finer material and grasses. *Ailuroedus* nests are unique in this family in incorporating mud. Nests of all species are cryptic, yet many species have the habit of nesting in traditional sites that result in many old disused nests in the area. Ptilonorhynchids typically lay 1 or 2 eggs, and sometimes 3. In the monogamous catbirds, both parents care for the nestlings, but only the female builds the nest and incubates the eggs. In the polygynous bowerbirds, the female raises the young entirely on her own, with fertilization being the male's only role in reproduction. The eggs take about three weeks to hatch, the nestlings leave the nest about three weeks post-hatch, and they appear to stay reliant on some parental care for up to two months more.



Green Catbird, *Ailuroedus crassirostris*. Mount Keira, New South Wales, Australia. © Graeme Chapman.

**Conservation** Habitat destruction is the primary conservation concern for two species (10%) of ptilonorhynchid (1 NT, 1 VU). Both Archbold's Bowerbird *Archboldia papuensis* and Adelbert Bowerbird *Sericulus bakeri* occur in high-elevation wet forest in New Guinea, which is particularly threatened by deforestation, and are listed as near threatened and vulnerable, respectively. Several species in Australia have declined in recent years due to habitat destruction, but all have large populations with large ranges.

**Relationships** Ptilonorhynchidae is part of the oscine passerine radiation, but falls outside the main superfamily groups. Although it was often considered part of the Corvoidea radiation, with affinities especially to Paradisaeidae, molecular phylogenetic evidence now suggests that Ptilonorhynchidae groups with Climacteridae to form a small clade that is sister to all remaining oscines save for Menuridae and Atrichornithidae (Barker *et al.* 2004, Chesser & Have 2007, Irestedt & Ohlson 2008, Norman *et al.* 2009, Jønsson *et al.* 2011).



# CLIMACTERIDAE
## Australasian Treecreepers

2 genera • 7 species

**Related Families** Ptilonorhynchidae (bowerbirds)

**Similar Birds** Woodcreepers (Furnariidae), treecreepers (Certhiidae), nuthatches (Sittidae)

**Description**
- Plumage generally brown, grayer or reddish in some, usually with distinct white-striped dark feathers on belly or breast
- Wings medium-short, broad; tail short, square
- Body small, cylindrical ovoid
- Bill short to medium, slender, slightly decurved
- Head medium-sized; neck short, thick
- Legs and toes thick; toes long with long curved claws
- Sexes generally similar; females sometimes with more rufous in plumage

**Habitat** Australian treecreepers live in a variety of wooded habitats, ranging from forest to open woodland and habitat edge.

**Food** Climacterids are primarily insectivorous, taking their prey from crevices in or beneath bark, or occasionally while hopping on the ground. They sometimes feed on tree sap and nectar as well.

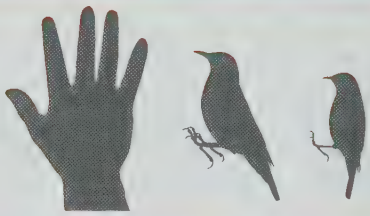
**Breeding** Australian treecreepers are monogamous, and most *Climacteris* species are cooperative breeders, retaining offspring from previous nestings and sometimes using immigrant helpers. They are obligate cavity-nesters, and typically nest in tree cavities created by microbial decay or termites. Because cavities are limited, holes are used repeatedly. Other nest sites that supplement natural cavities include holes in banks, pipes, chimneys, and crevices in the eaves of buildings. The nest constructed in a cavity is a cup built of grass, bark, moss, fur, and other material. Females typically lay 1 to 3 eggs. In the noncooperatively breeding *Coromobates* treecreepers, only the female constructs the nest and incubates the eggs. In the *Climacteris* treecreepers, both male and female help with nest construction, but the female alone incubates. Those species with cooperative breeding have up to three helpers, almost always males. Helpers participate in nest construction and territory defense, and bring food to incubating females and young. Incubation periods range from 16 to 23 days; the nestlings stay in the nest for 25 to 28 days, and the fledged young receive continued provisioning for up to another 40 days or so.

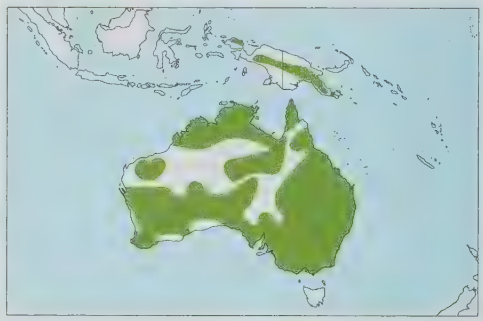


White-throated Treecreeper, *Cormobates leucophaea*. Warrumbungle National Park, New South Wales, Australia. © Drew Fulton.

**Conservation** No climacterid species face immediate conservation concerns.

**Relationships** Climacteridae is part of the oscine passerine radiation, but belongs outside the main superfamily groups. Although previously considered part of the Corvoidea radiation, molecular phylogenetic evidence now suggests that Climacteridae is sister to Ptilonorhynchidae, forming a small clade that is sister to all remaining oscines save for Menuridae and Atrichornithidae (Barker *et al.* 2004, Irestedt & Ohlson 2008, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014).





Every avifauna includes birds that live and forage on the bark of large trees, and this is one of the two families in Australia to do so. Unlike woodpeckers or Holarctic creepers, these birds climb up tree trunks without relying on any kind of tail stiffening for support, utilizing instead their powerful feet and claws, particularly a hind toe that is specially adapted for flexible support. After working their way to the top of a tree trunk, these birds fly down to the bottom of a nearby trunk to begin foraging again. They are the only Australian passerines that habitually nest in cavities left by broken-off tree limbs. Approximately half of these species are cooperative breeders.



Brown Treecreeper, *Climacteris picumnus*. Brachina Gorge, Flinders Ranges NP, South Australia. © Drew Fulton.



*CORMOBATES*
2 species

*C. leucophaea*
White-throated Treecreeper



*CLIMACTERIS*
5 species

*C. rufus*
Rufous Treecreeper

Passeriformes, "Basal Oscines"

# MALURIDAE
## Fairywrens

6 genera • 27 species

**Related Families** Acanthizidae (thornbills), Pardalotidae (pardalotes), Meliphagidae (honeyeaters), Dasyornithidae (bristlebirds)

**Similar Birds** Cisticolas and prinias (Cisticolidae), grassbirds (Locustellidae), canasteros and spinetails (Furnariidae)

**Description**
- *Malurus* fairywrens often with bright blue or reddish patches; members of other genera brown with streaks
- Wings short, rounded; tail long, often held cocked over back
- Body very small to small, ovoid, with upright posture
- Bill short to medium, straight, slender
- Head large to medium; neck short, thick
- Legs medium to long; feet small to medium; both delicate
- Males often much more brightly colored than females

**Habitat** Fairywrens live in a wide variety of habitats, ranging from tropical rainforest to arid scrubland and desert.

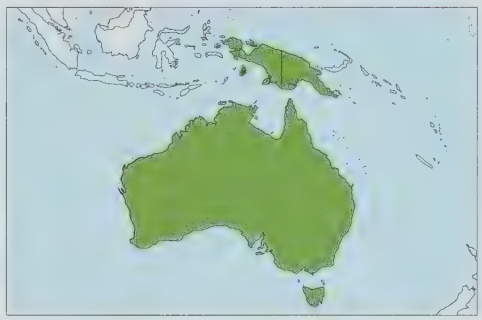
**Food** Malurids are primarily insectivorous, although *Amytornis* grasswrens consume substantial quantities of seeds and fruit when insects are scarce.

**Breeding** All malurids are believed to live in groups, and all may be cooperative breeders. In the *Malurus* fairywrens, cooperative breeding is common, and, because of extremely high levels of extra-pair paternity, the dominant male often sires very few of the chicks that he helps raise. Helpers in these cooperative breeding groups are usually males that are related to the female, whereas the dominant male is often unrelated. Most malurids build a domed nest, often on or near the ground, although some grasswrens build an open cup nest. Females lay 2 to 4 eggs. Nest construction and incubation are done only by females, and incubation takes 12 to 17 days. The female broods the chicks almost continuously for the first few days, and food brought by the male and helpers is fed to her and is then passed on to the chicks. The chicks leave the nest at about 10 to 15 days post-hatch, and they continue to be fed by parents and helpers outside the nest for at least another 10 days of continued wing and tail growth. Most malurids appear to be



Superb Fairywren, *Malurus cyaneus*. Wollongong, New South Wales, Australia. © Mark A. Chappell.





These perky, light-footed jewels live in a wide variety of habitats in Australia and New Guinea. Though their plumage colors are varied, some with exquisite splashes of blue and red and others streaked in muted earth tones, this diversity is grounded in a unified body plan and some of the most complicated mating systems in birds. Indeed, males in this family have reproductive tracts that are well adapted to meet the demands of sexual competition with their rivals, and some species practice high rates of extra-pair mating. But their courtship does not just entail well-developed gonads and feathered finery—males of many species carry a flower petal or fruit with them when they woo neighboring females.



Kalkadoon Grasswren, *Amytornis ballarae*. Mount Isa, Queensland, Australia. © Drew Fulton.

completely independent within about a month of fledging.

**Conservation** Habitat destruction and degradation due to an increased prevalence of fire is the primary conservation concern for three species (11%) of maluroids (1 NT, 1 VU, 1 EN). The Mallee Emu-wren *Stipiturus mallee* has a naturally small and fragmented range that makes it particularly vulnerable to fire, resulting in its endangered status. Both the White-throated Grasswren *Amytornis woodwardi* and Carpentarian Grasswren *Amytornis dorotheae* suffer from fire as well, and are classified as vulnerable and near threatened, respectively.

**Relationships** Maluridae is part of the meliphagoid clade, within what we informally call the basal oscine passerines (Barker *et al.* 2004, Driskell *et al.* 2007, Norman *et al.* 2009, Gardner *et al.* 2010, Jønsson *et al.* 2011, Barker 2014). Maluridae appears be sister to the remaining four families in this group, those being Meliphagidae, Dasyornithidae, Pardalotidae, and Acanthizidae (Barker *et al.* 2004, Driskell *et al.* 2007, Gardner *et al.* 2010). Within Maluridae, there are two distinct clades, here classified as distinct subfamilies (Cracraft 2014): the grasswrens (Amytornithinae) are sister to Malurinae, which is composed of the emu-wrens and fairy-wrens (Lee *et al.* 2012).



Variegated Fairywren, *Malurus lamberti*. Round Hill, New South Wales, Australia. © Graeme Chapman.

## Subfamily **MALURINAE**

*SIPODOTUS*
1 species



*S. wallacii*
Wallace's Wren

*CLYTOMYIAS*
1 species



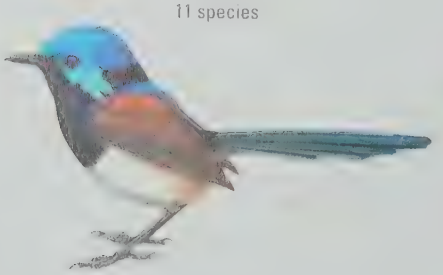
*C. insignis*
Orange-crowned Wren

*CHENORHAMPHUS*
1 species



*C. grayi*
Broad-billed Fairywren

*MALURUS*
11 species



*M. lamberti*
Variegated Fairywren

*STIPITURUS*
3 species



*S. ruficeps*
Rufous-crowned Emu-wren

## Subfamily **AMYTORNITHINAE**

*AMYTORNIS*
10 species



*A. woodwardi*
White-throated Grasswren

Passeriformes, "Basal Oscines"

# DASYORNITHIDAE
## Bristlebirds

1 genus • 3 species

**Related Families** Meliphagidae (honeyeaters), Acanthizidae (thornbills), Pardalotidae (pardalotes)

**Similar Birds** Scrub-birds (Atrichornithidae), thornbills (Acanthizidae), towhees (Passerellidae), thrushes (Turdidae)

**Description**
- Plumage generally dull brown, and some species with rufous
- Wings short, rounded; tail long, rounded, graduated
- Body small, cylindrical ovoid, typically with horizontal posture
- Bill medium-short, straight, narrow, and sharply pointed
- Head medium-sized; neck medium-short, thick
- Legs and feet medium-long and stout
- Sexes similar

**Habitat** Bristlebirds live in shrubby habitats with dense vegetation, such as coastal heathlands or forested gullies.

**Food** Dasyornithids forage through leaf litter in search of insects and other small invertebrate prey, as well as for seeds.

**Breeding** Little is known about bristlebirds' breeding biology, as they are shy and secretive, spending most of their lives in inaccessible thickets. It appears, however, that bristlebirds are monogamous with biparental care. Bristlebird nests are somewhat messy domed structures built mostly of grasses, twigs, sedges, and a variety of other plant material. Clutch size is almost always 2 eggs. Limited data suggest that only the female incubates the eggs, and that both male and female provision the young. Incubation appears to take 16 to 21 days, and the nesting period is about the same. Fledged young appear to remain in the care of the parents for some time after fledging, but this needs to be confirmed, and so many other details of the breeding biology of these birds remain to be discovered.



Western Bristlebird, *Dasyornis longirostris*. Cheynes Beach, Waychinicup NP, Western Australia. © Drew Fulton.

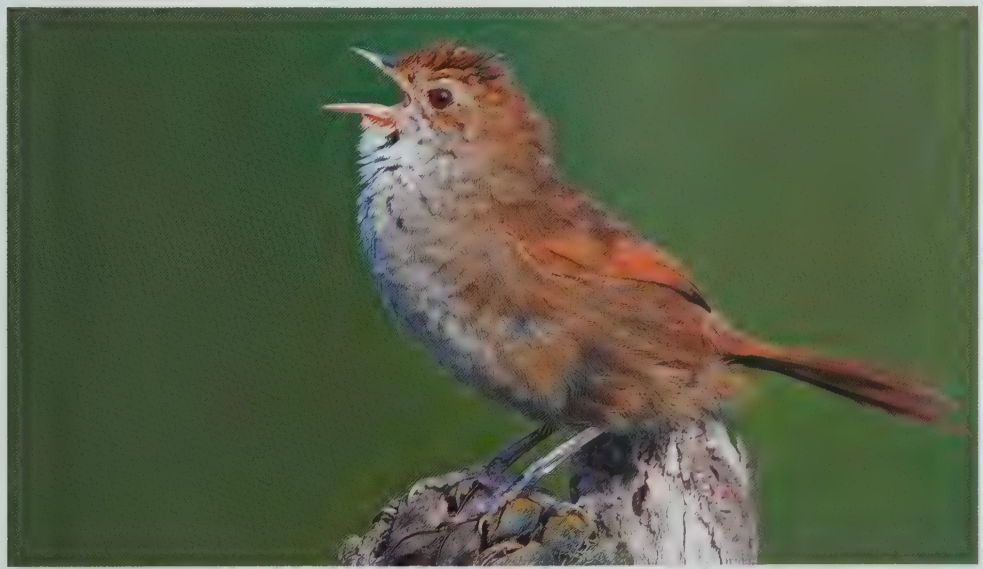
**Conservation** Two of the three species of bristlebird (67%) face serious conservation concerns (1 VU, 1 EN). The endangered Eastern Bristlebird *Dasyornis brachypterus* has a very fragmented range in eastern Australia as a result of extensive habitat alteration. While its population is currently stable, several subpopulations are rapidly declining to extinction, and the threat of destructive fires in the remaining populations is a constant threat. The vulnerable Western Bristlebird *D. longirostris*, the focus of extensive conservation measures, has a small population and a very restricted distribution in southwestern Australia, where it is primarily threatened by wildfires.

**Relationships** The bristlebirds are part of the meliphagoid clade, within what we call the basal oscine passerines (Driskell & Christidis 2004, Gardner *et al.* 2010). Samples from this family have not been included in most broad surveys of passerine relationships, but the available evidence indicates that Dasyornithidae is sister to a clade formed by Meliphagidae, Pardalotidae, and Acanthizidae (Gardner *et al.* 2010).





These long-tailed, short-winged Australian birds are named for the two small bristle-like feathers that protrude from between their eyes and bills. They are secretive residents of dense Australian scrub habitats, and as with other birds with similar habitat preferences, most of the information available about the breeding biology of these mid-sized brown birds is based on a very limited number of field observations. Frustrated observers, however, might have better luck hearing them. All three species have sweet but penetrating voices, and during the breeding season the male and female sing antiphonal duets. Thus, future study of these birds offers a fitting challenge for aspiring field ornithologists in the sunburned country!



Eastern Bristlebird, *Dasyornis brachypterus*. Barren Grounds Nature Reserve, New South Wales, Australia. © Nevil Lazarus.

*DASYORNIS*
3 species



*D. broadbenti*
Rufous Bristlebird

# MELIPHAGIDAE
## Honeyeaters

50 genera • 180 species

**Related Families** Pardalotidae (pardalotes), Maluridae (fairywrens), Acanthizidae (thornbills)

**Similar Birds** Honeycreepers (Thraupidae and Fringillidae), bulbuls (Pycnonotidae), sunbirds (Necatariniidae)

**Description**
- Plumage variable; some species mostly in dull earth tones, others with black plumage contrasting with patches of bright color
- Wings long, pointed; tail short to medium-long
- Body small to medium, cylindrical ovoid
- Bill medium to medium-long, slender, decurved
- Head medium-sized, often with wattles, casques, or unfeathered patches; neck medium length, thick
- Legs and feet medium length, but generally stout
- Males more brightly colored in some species

**Habitat** Meliphagids live in a wide variety of habitats where flowering plants are present, from arid scrubland and woodlands in the Australian interior to the tropical rainforests of coastal Australia and New Guinea.

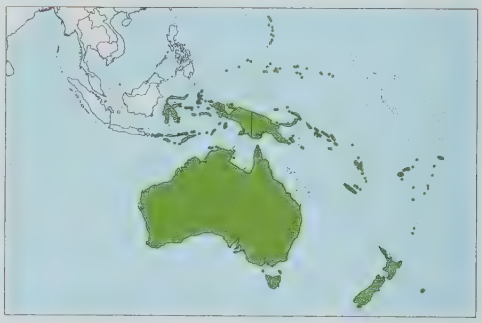
**Food** Although honeyeaters have specializations of the tongue and bill for feeding on nectar, most have a very varied diet that also includes insects, other arthropods, and fruit, along with the honeydew secretions of insects (see Pardalotidae). Many species are at least partially nomadic and will travel some distance to find sources of nectar. Many species are also extremely territorial and will vigorously defend reliable sources of pollen and nectar from other birds.

**Breeding** Meliphagids are, with few exceptions, monogamous with biparental care, and some *Manorina* and *Melithreptus* species breed cooperatively. Some species aggregate to nest in colonies or, especially in *Manorina*, an expanded collection of territories with complicated and extensive interactions among other nesting pairs in the group. Nests are cup-shaped, and are either hung by the rim from branches in trees or placed in the fork of a branch. Meliphagids lay 1 to 4 eggs, with smaller average clutch sizes in tropical species. In most species, it appears that only the female builds the nest and incubates the eggs, but the male (and helpers, if present) helps in feeding chicks. Incuba-



Spiny-cheeked Honeyeater, *Acanthagenys rufogularis*. Fowler's Gap, New South Wales, Australia. © Mark A. Chappell.





Although a few species of this rich group have dispersed north and east into the islands of the Pacific, the vast majority live in Australo-Papua itself, and none have crossed Wallace's line into Asia. They earn their names because they eat pollen and nectar, harvested from flowers with their brush-tipped tongues, thus playing an integral role in the pollination biology of native plants. Many of the Australian species have evolved complicated and poorly understood movement patterns, tracking the blooming of specific flowering plants over the vast expanses of that island continent. Most have bills that are at least slightly decurved, with ornamentation of brilliantly colored skin or feather tufts very common on the head and upper breast.



New Holland Honeyeater, *Phylidonyris novaehollandiae*. Kettering, Tasmania. © G. B. Baker.

tion takes 12 to 17 days, and nestling periods range from 11 to more than 20 days. The young seem generally to receive care after fledging, and in the few studies available, it appears that they become independent of parental care four to six weeks after fledging.

**Conservation** While most species of meliphagid face no immediate conservation concerns, 14 species (8%) are at risk (5 NT, 5 VU, 3 EN, 1 CR). One particularly rare meliphagid is the critically endangered Crow Honeyeater *Gymnomyza aubryana*. Found only in New Caledonia, this species is rapidly declining, perhaps because of predation by introduced rats. Most of the endangered and vulnerable species are narrowly endemic forms, making them especially vulnerable to habitat changes. Two species, however, have broad Australian ranges: the endangered Regent Honeyeater *Anthochaera phrygia* and the vulnerable Painted Honeyeater *Grantiella picta* have probably both suffered from the clearing of large tracts of *Eucalyptus* forest and from forestry practices that do not allow the growth of old, large, flowering trees.

**Relationships** The honeyeaters are the namesake of the meliphagoid clade, which roots deeply within Passeri (Barker *et al.* 2004, Driskell & Christidis 2004, Driskell *et al.* 2007, Norman *et al.* 2009, Gardner *et al.* 2010, Jønsson *et al.* 2011, Barker 2014, Joseph *et al.* 2014). Within this clade, Meliphagidae is most likely sister to a group formed by Pardalotidae and Acanthizidae (Gardner *et al.* 2010). Molecular phylogenetic studies have recently shown that the Australian chats (*Epthianura*)—a group of very brightly colored birds found in the arid lands of Australia that was often placed in its own family, Epthianuridae—fall within this family (Barker *et al.* 2004, Driskell & Christidis 2004, Driskell *et al.* 2007, Joseph *et al.* 2014). In contrast, molecular phylogenetic analyses have shown that the five recently extinct Hawaiian species of the genus *Moho*, long thought to be meliphagids, are only very distantly related. Instead, these Hawaiian endemic birds represented a case of convergent evolution to a honeyeater-like morphology, with *Moho* instead being the sole representatives of a distinct Mohoidae that was probably most closely related to Bombycillidae and Ptilogonatidae, among others (Fleischer *et al.* 2008).



Noisy Miner, *Manorina melanocephala*. Dalby, Queensland, Australia. © B. G. Thomson.



Western Spinebill, *Acanthorhynchus superciliosus*. Cheynes Beach, Waychinicup NP, Western Australia. © Drew Fulton.



Yellow-tinted Honeyeater, *Ptilotula flavescens*. Lake Argyle, Western Australia. © Drew Fulton.

## *Acanthorhynchus*
2 species



*A. tenuirostris*
Eastern Spinebill

## *Pycnopygius*
3 species



*P. cinereus*
Marbled Honeyeater

## *Certhionyx*
1 species



*C. variegatus*
Pied Honeyeater

## *Prosthemadera*
1 species



*P. novaeseelandiae*
Tui

## *Anthornis*
1 species



*A. melanura*
New Zealand Bellbird

## *Guadalcanaria*
1 species



*G. inexpectata*
Guadalcanal Honeyeater

## *Oreornis*
1 species



*O. chrysogenys*
Orange-cheeked Honeyeater

## *Meliphaga*
15 species



*M. lewinii*
Lewin's Honeyeater

## *Gavicalis*
3 species



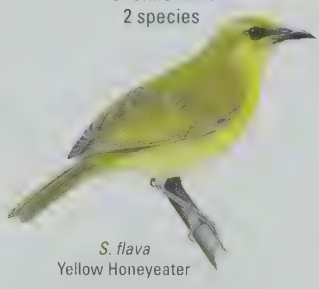
*G. virescens*
Singing Honeyeater

## *Ptilotula*
6 species



*P. penicillata*
White-plumed Honeyeater

## *Stomiopera*
2 species



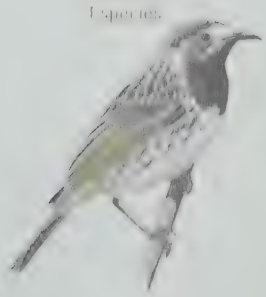
*S. flava*
Yellow Honeyeater

## *Caligavis*
3 species



*C. subfrenata*
Black-throated Honeyeater

## *Purnella*
1 species



*P. albifrons*
White-fronted Honeyeater

## *Lichenostomus*
2 species



*L. melanops*
Yellow-tufted Honeyeater

## *Melidectes*
10 species

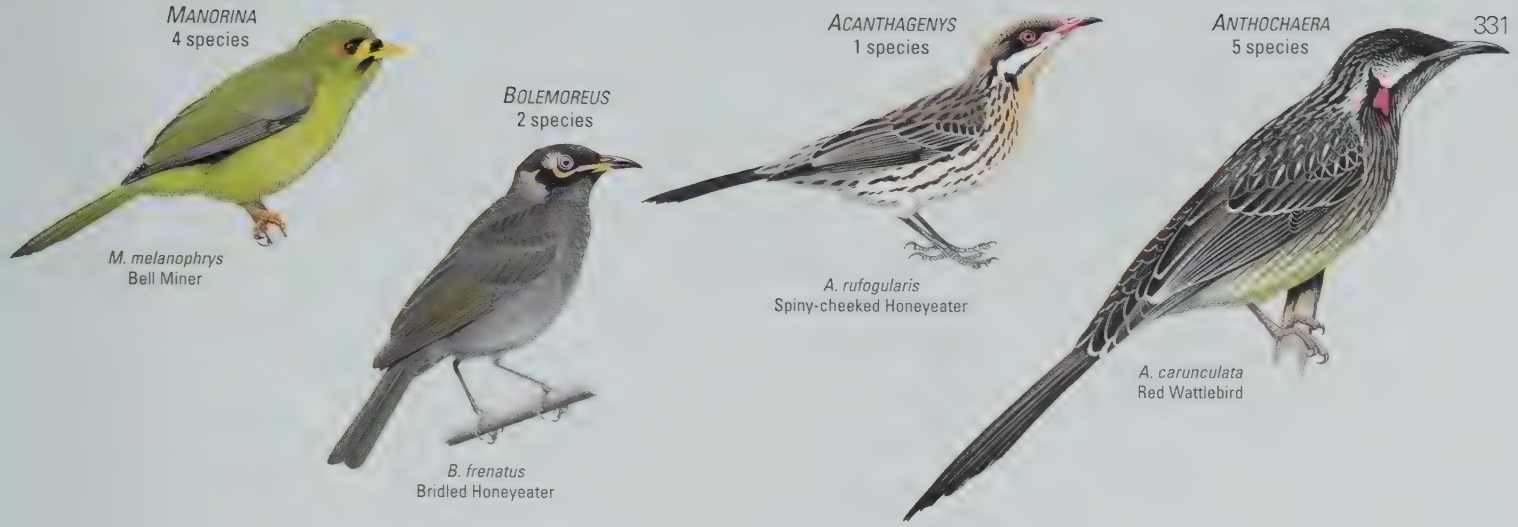


*M. belfordi*
Belford's Honeyeater

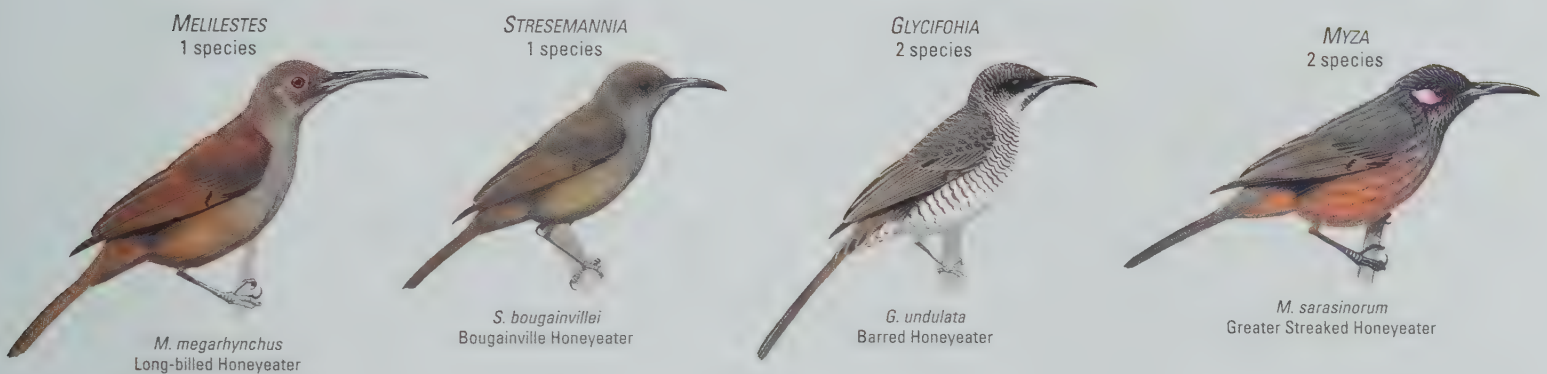
## *Meliarchus*
1 species



*M. sclateri*
San Cristobal Honeyeater


MANORINA
4 species
M. melanophrys
Bell Miner
BOLEMOREUS
2 species
B. frenatus
Bridled Honeyeater
ACANTHAGENYS
1 species
A. rufogularis
Spiny-cheeked Honeyeater
ANTHOCHAERA
5 species
A. carunculata
Red Wattlebird


RAMSAYORNIS
2 species
R. fasciatus
Bar-breasted Honeyeater
CONOPOPHILA
3 species
C. albogularis
Rufous-banded Honeyeater
EPTHIANURA
4 species
E. tricolor
Crimson Chat
ASHBYIA
1 species
A. lovensis
Gibberbird
TIMELIOPSIS
2 species
T. fulvigula
Olive Straightbill


MELILESTES
1 species
M. megarhynchus
Long-billed Honeyeater
STRESEMANNIA
1 species
S. bougainvillei
Bougainville Honeyeater
GLYCIFOHIA
2 species
G. undulata
Barred Honeyeater
MYZA
2 species
M. sarasinorum
Greater Streaked Honeyeater


MELIPOTES
4 species
M. carolae
Wattled Smoky Honeyeater
MACGREGORIA
1 species
M. pulchra
MacGregor's Honeyeater
SUGOMEL
1 species
S. nigrum
Black Honeyeater
MYZOMELA
31 species
M. cardinalis
Cardinal Myzomela


GLYCICHAERA
1 species
G. fallax
Green-backed Honeyeater
PTILOPRORA
6 species
P. guisei
Rufous-backed Honeyeater
GLICIPHILA
1 species
G. melanops
Tawny-crowned Honeyeater
CISSOMELA
1 species
C. pectoralis
Banded Honeyeater
LICHMERA
11 species
L. indistincta
Brown Honeyeater
PHYLIDONYRIS
3 species
P. novaehollandiae
New Holland Honeyeater
TRICHODERE
1 species
T. cockerelli
White-streaked Honeyeater
NESOPTILOTIS
2 species
N. leucotis
White-eared Honeyeater
FOULEHAIO
1 species
F. carunculatus
Wattled Honeyeater
GYMNOMYZA
3 species
G. aubryana
Crow Honeyeater
MELITHREPTUS
6 species
M. lunatus
White-naped Honeyeater
ENTOMYZON
1 species
E. cyanotis
Blue-faced Honeyeater
PHILEMON
16 species
P. buceroides
Helmeted Friarbird
MELITOGRAIS
1 species
M. gilolensis
White-streaked Friarbird
XANTHOTIS
4 species
X. polygrammus
Spotted Honeyeater
PLECTORHYNCHA
1 species
P. lanceolata
Striped Honeyeater
GRANTIELLA
1 species
G. picta
Painted Honeyeater

Passeriformes, "Basal Oscines"

# PARDALOTIDAE
## Pardalotes

1 genus · 4 species

**Related Families** Acanthizidae (thornbills), Meliphagidae (honeyeaters)

**Similar Birds** Tanagers (Thraupidae), manakins (Pipridae), euphonias (Fringillidae), babblers (Timaliidae)

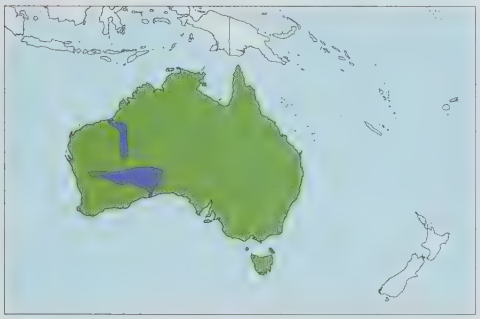
**Description**
- Plumage brightly colored; most with white and yellow supercilium, black cap with white streaks or spots, white patterning on wing, and some yellow on body
- Wings long, pointed; tail short
- Body very small to small; ovoid, compact
- Bill short, stout
- Head large; neck short, thick
- Legs medium length; feet stout
- Males more brightly colored and boldly patterned

**Habitat** Pardalotes are found in forest and open woodland habitats, particularly with *Eucalyptus*.



Spotted Pardalote, *Pardalotus punctatus*.
Gloucester NP, Western Australia. © Alex Vargas.





**Food** Pardalotes feed mainly on invertebrates and on the sap exuded by insects feeding on trees, or oozed by the plants as a response to insect damage. In the former case, plant juices are passed through the larvae of psyllid insects to produce a sweet cottony protective covering called a lerp. In the latter case, sap congeals in droplets on leaves and bark of *Eucalyptus* trees, and eventually falls to the ground. These droplets of sap are called "manna" in Australia. Both of these form an important part of the diet of pardalotes, and it is thought that pardalotes' short stout bills may have evolved to efficiently dislodge lerps from leaves.

**Breeding** Pardalotes are monogamous with biparental care, and pairs often remain together for several seasons. Unlike most other Australian passerine families, there is no evidence for cooperative breeding in this family. In some places, large numbers of pardalotes will nest in a small area, but these aggregations are thought to reflect nest-site limitation, not sociality per se. Pardalotes are cavity-nesters, with some species excavating their own cavities in the ground and others burrowing or adopting pre-existing tree cavities. Within the cavity, pardalotes build a domed nest of grass and bark strips. Females typically lay 3 to 5 white eggs. Although it is thought that the female takes on the majority of nest-building, both members of the pair incubate the eggs and feed the young. Incubation takes 16 to 24 days, and the nestlings fledge after 18 to 25 days in the nest.

**Conservation** Only one species of pardalote (25%) is of conservation concern (1 EN). The endangered Forty-spotted Pardalote *Pardalotus quadragintus* is endemic to Tasmania and has always had a small range. Though its population size has stabilized, its habitat is still highly fragmented, and it is particularly vulnerable because it is dependent on lerps and manna from one species, *Eucalyptus viminalis*.

**Relationships** The pardalotes are part of the meliphagoid clade, which roots deeply within the oscine passerines (Barker *et al.* 2004, Driskell & Christidis 2004, Driskell *et al.* 2007, Gardner *et al.* 2010). Pardalotidae seems either to be sister to Acanthizidae, with both together in turn sister to Meliphagidae (Gardner *et al.* 2010), or to Meliphagidae, with these two taken together sister to Acanthizidae (Driskell & Christidis 2004). The pardalotes are sometimes merged with the thornbills into a larger Pardalotidae, but they are distinctive enough in biology and appearance that we prefer to retain the two as separate families.

Pardalotes combine personality, attractive plumage, and intriguing habits to an extent matched by few other families of birds. These tiny short-tailed bundles of energy are endemic to Australia, not even making it to nearby New Guinea. They build their nests in holes in trees, in earthen banks, or even in potted plants left on a porch. Unlike many of their close relatives on this continent, pardalotes raise their young without the assistance of offspring from prior nesting seasons, though they can be quite social in the non-breeding season. These stubby little birds often join mixed-species feeding flocks, where they tend to be dominated or excluded by their larger cousins the honeyeaters.



Red-browed Pardalote, *Pardalotus rubricatus*. Sturt NP, New South Wales, Australia. © Nevil Lazarus.

*PARDALOTUS*
4 species



*P. quadragintus*
Forty-spotted Pardalote

# ACANTHIZIDAE
## Thornbills

13 genera • 64 species

Related Families Pardalotidae (pardalotes), Meliphagidae (honeyeaters)

Similar Birds Warblers (Cisticolidae, Acrocephalidae, Parulidae, Scotocercidae, Sylviidae), grassbirds (Locustellidae)

Description
- Plumage generally brown, some with yellow
- Wings short, rounded; tail medium length
- Body very small to small, ovoid
- Bill small, thin, pointed in most species
- Head medium-sized; neck short, thick
- Legs medium-long; feet medium to robust
- Sexes similar

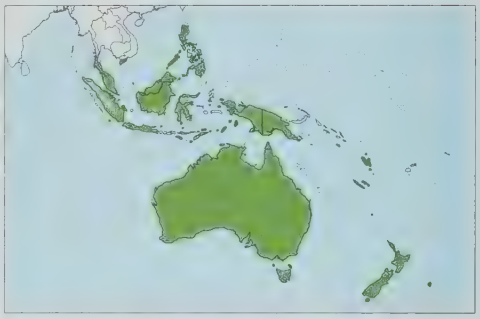
Habitat The thornbills live in a wide variety of habitats, ranging from tropical rainforests to arid woodland and scrubland.

Food Insects and other small invertebrates are the primary food for most thornbills, and many species include fruit and seeds, as well as nectar, lerps, and manna, in their diets.



Inland Thornbill, *Acanthiza apicalis*.
Warrumbungle NP, New South Wales, Australia. © Drew Fulton.





Breeding In the thornbills, as with many other Australian passerine families, cooperative breeding is fairly common. Nest type varies substantially among genera in this family. *Gerygone* species build hanging nests, often with a long "tail"; these pendulous nests are often spherical in structure, with an opening in the side. Other species commonly build domed nests on or near the ground, sometimes with false nests on top, perhaps as decoys to potential nest predators or brood parasites. Acanthizid nests are constructed mainly of leaves, grasses, and twigs, and in some species a great amount of spiderwebs and possibly even saliva may be worked in. Female acanthizids usually lay 2 to 4 eggs. Incubation takes 10 (or more commonly 15) to 21 days, and the nestlings leave after 13 to 21 days in the nest. Only female acanthizids incubate, but both parents, and helpers when present, help provision the young.

Conservation Most acanthizids face no immediate conservation concerns, but three species (5%) face some conservation challenges (1 NT, 1 VU, 1 EN). All three of these are restricted to small ranges: two are narrowly endemic gery-

The acanthizids are the "little brown jobs" of Australia and New Guinea. Active birds, commonly seen hopping through branches or on the ground in search of insect prey, they are brown or mousy gray, some with a bit of yellow or green, or a mask and eye-stripe to liven things up. They have the same generalized songbird profile and span the same range of sizes that "warblers" of all sorts do on other continents. More so than many small birds, acanthizids often protect their nests from predators by associating with other species: some species build their nests in or next to those of social spiders, others choosing wasps or birds of prey.



Weebill, *Smicrornis brevirostris*. Castlereagh, New South Wales, Australia. © Nevil Lazarus.

gones on islands, while the near-threatened Chestnut-breasted Whiteface *Aphelocephala pectoralis* is restricted to a small range in arid South Australia where habitat alteration by grazing and mining are compounded by the effects of drought. One species of acanthizid has gone extinct within the past 100 years: the Lord Howe Gerygone *Gerygone insularis*, an island endemic, was driven to extinction by the introduction of rats to Lord Howe Island in 1918.

**Relationships** The thornbills are a diverse family that is part of the meliphagoid radiation within the basal oscine passerines (Barker *et al.* 2004, Driskell & Christidis 2004, Gardner *et al.* 2010, Cracraft 2014, Joseph *et al.* 2014). Acanthizidae is likely sister to Pardalotidae (Gardner *et al.* 2010), though another study suggests that thornbills are sister to the clade that includes both Pardalotidae and Meliphagidae (Driskell & Christidis 2004). The thornbills have sometimes been merged with the pardalotes into a larger Pardalotidae, though we prefer to retain them as separate groups due to their distinctiveness. Within Acanthizidae, two subfamilies can be recognized, with the two distinct genera *Pachycare* and *Oreoscopus* being placed in Oreoscopinae, which is sister to the remaining acanthizids in Acanthizinae (Nyári & Joseph 2012, Cracraft 2014).



White-throated Gerygone, *Gerygone olivacea*. Canberra, Australia. © Graeme Chapman.



# ORTHONYCHIDAE

1 genus • 3 species

## Logrunners

**Related Families** Pomatostomidae (Australasian babblers)

**Similar Birds** Quail-thrushes (Cinclosomatidae), ant-thrushes (Formicariidae), antbirds (Thamnophilidae)

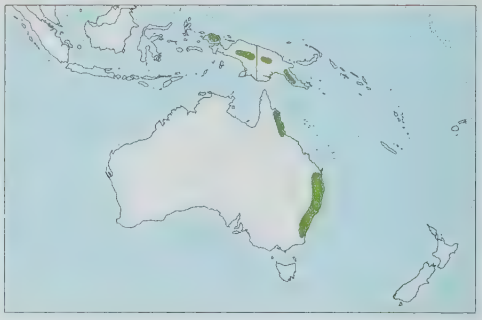
**Description**

- Gray and brown and patterned, or all dark brown above, with rufous and white below
- Wings short, rounded; tail medium-long, rounded, with stiff terminal spines
- Body medium-small, cylindrical ovoid, with horizontal posture
- Bill medium length, stout
- Head of medium size; neck short, thick
- Legs long; feet large, with long, curved claws
- Males larger, with a white (as opposed to rufous) throat



Chowchilla, *Orthonyx spaldingii*.
Cape York, Queensland, Australia. © Jon Irvine.





**Habitat** The logrunners and Chowchilla live in rainforest with areas of diverse cover. Their preferred foraging habitat is open, shaded understory with large quantities of leaf litter. For nesting, however, orthonychids also require dense shrubs, such as those found in forest edges and stream sides.

**Food** Orthonychids forage through leaf litter to uncover insects and other invertebrates. One of the most distinctive features of the orthonychids is their foraging strategy and associated morphology. Their legs have a modified femur and pelvis that allow them to swing their legs outward to remove leaf litter from the ground while foraging. Orthonychids are able to rotate their legs to kick leaf litter off to their side. They alternate sides as they forage thorough the forest litter, using one leg to kick leaf litter to reveal prey, while they support themselves with the opposite leg and spine-tipped tail.

**Breeding** The logrunners and Chowchilla are monogamous. Although they live in social groups, the other group members do not appear to help with any aspect of breeding, being involved only in territorial defense. The nest is a globular structure built on or near the ground. The outside of the nest is composed primarily of sticks and twigs, with moss and other plant materials also incorporated into the structure, while the inner nest chamber is lined with moss, bark strips, and other fine material. The Australian Logrunner *Orthonyx temminckii* breeds most commonly in the austral winter; the Chowchilla *O. spaldingii* can breed any time of the year. Females lay 1 to 3 eggs, the typical number being 2 in the logrunners and only 1 in the Chowchilla. Only the female constructs the nest, incubates the egg, and feeds chicks in the nest. Incubation takes 21 to 25 days, the chicks fledge after 18 to 27 days in the nest, and the fledglings are tended and provisioned at least occasionally for up to several months after fledging. The male helps feed the chicks once they've fledged, and he brings food to the female during nesting, and throughout the year.

**Conservation** No orthonychids face immediate conservation concerns.

**Relationships** Orthonychidae represents an old lineage in the basal oscine passerines, outside of the traditionally recognized superfamilies. Previous classifications have grouped Orthonychidae with many other families, including Psophodidae, Cinclosomatidae, and Eupetidae, but this family is now thought to be either sister to Pomatostomidae (Jønsson *et al.* 2007, Chesser & Have 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2008b, Aggerbeck *et al.* 2014) or in a ladderized phylogeny as sister to the clade that does (Jønsson *et al.* 2011) or does not include Pomatostomidae (Driskell *et al.* 2007) and the rest of the oscine passerines (excluding Menuridae, Atrichornithidae, Ptilonorhynchidae, and Climacteridae).



Australian Logrunner, *Orthonyx temminckii*. Green Mountains, Lamington NP, Queensland, Australia. © Drew Fulton.

The logrunners, enigmatic denizens of the wet forests of eastern Australia and New Guinea, spend most of their time on the ground, foraging for invertebrates in the forest litter with lateral movements of their strong legs. This unusual leg movement (most passerines sort through the litter with movements fore and aft) has left its distinctive signature on the skeletal anatomy of these birds, allowing even a single leg bone to be recognized in partial fossil deposits from many millions of years ago. The flight musculature of orthonychids is also reduced, and they seldom fly very far, probably spending all their lives in a small patch of rainforest floor.

*ORTHONYX*
3 species



*O. novaeguineae*
New Guinean Logrunner

Passeriformes, "Basal Oscines"

# POMATOSTOMIDAE
## Australasian Babblers

2 genera • 5 species

**Related Families** Orthonychidae (logrunners)

**Similar Birds** Scimitar babblers (Timaliidae), honeyeaters (Meliphagidae)

**Description**
- Plumage generally gray-brown; most with white throat and eye-stripe and black bill, but one species (New Guinea Babbler *Garritornis isidorei*) wholly rufous with yellow bill
- Wings medium length, rounded; tail long, generally with rounded white tip
- Body medium-sized, cylindrical ovoid, with hunched, horizontal posture
- Bill medium-long, decurved
- Head medium-sized; neck medium length, thick
- Legs and feet medium length
- Sexes similar

**Habitat** Australian pomatostomids live in temperate arid or semi-arid woodlands, whereas *Garritornis* lives in moist forests in New Guinea.

**Food** Pomatostomids feed primarily on insects and other arthropods, but in certain seasons they take fruit and seeds. They most often forage on the ground and in low vegetation and obtain most prey by gleaning or probing bark. Most species are well adapted to xeric conditions and have never been observed drinking water.



Chestnut-crowned Babbler, *Pomatostomus ruficeps*. Bowra Station, Cunnamulla, Queensland, Australia. © Drew Fulton.



**Breeding** Pomatostomids are monogamous, cooperative breeders, with up to 11 helpers in their groups. Both male and female pomatostomids become helpers, in contrast to many other cooperatively breeding species where helpers are typically male. Evidence from the Gray-crowned Babbler *Pomatostomus temporalis* suggests that pomatostomids are obligate cooperative breeders, and that a breeding pair cannot successfully raise a brood without helpers. The nests of pomatostomids are large, domed structures of sticks. These nests are used not only for nesting, but also for roosting throughout the year; thus, they receive year-round maintenance by the group. Because roosting occurs in nests, multiple nests in a territory are sometimes necessary to accommodate the entire group. Females lay 1 to 6 eggs. Although only the dominant pair in each group usually mates and produces eggs, occasional large clutches

The species in this family superficially resemble the scimitar babblers of Asia, but they are not closely related to them at all. Like so many other Australian birds, they live in extended family groups most of their lives, with many birds staying home to help with subsequent breeding attempts. The resulting groups of up to ten or more birds stay together throughout the year, often in very dry desert scrub, where, working together, they somehow find enough insect prey to survive.



Gray-crowned Babbler, *Pomatostomus temporalis*. Lakefield NP, North Queensland, Australia. © Graeme Chapman.

suggest that two females from the group may sometimes lay in the same nesting attempt. Typically, only the dominant female incubates the eggs, although in groups with a female helper, she may also incubate. Incubation takes from 19 to 25 days, and the brood fledges 16 to 23 days after hatching. Helpers are active in nest construction, and in feeding the incubating female and young. Fledglings are fed for up to several months after fledging, and they remain in the natal territory for at least a year, usually becoming helpers.

**Conservation** No pomatostomid species face any immediate conservation threats, although some subspecies in Australia are declining quite rapidly because of habitat loss.

**Relationships** Pomatostomidae represents an old lineage that separated during the very early radiation of oscine passerines, and most recent phylogenies that include it place it as sister to Climacteridae (Jønsson *et al.* 2007, Chesser & Have 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2008b, Aggerbeck *et al.* 2014) or as trading places with Climacteridae as sister to the rest of oscine passerines (e.g., Driskell *et al.* 2007 vs. Jønsson *et al.* 2011). We have tentatively concluded Climacteridae to be the most closely related family. As their common name suggests, Pomatostomidae was originally thought to form a clade within Timaliidae, but both morphological and molecular phylogenetic evidence now shows that they are distant from all other lineages previously grouped with the babblers.



Gray-crowned Babbler, *Pomatostomus temporalis*. Great Western Highway, Mount Victoria, New South Wales, Australia. © John McKean.

*GARRITORNIS*
1 species



*G. isidorei*
New Guinea Babbler

*POMATOSTOMUS*
4 species



*P. halli*
Hall's Babbler

# Order: Passeriformes, Corvoid Oscines

Families: Mohouidae, Eulacestomidae, Neosittidae, Oriolidae, Paramythiidae, Oreoicidae, Cinclosomatidae, Falcunculidae, Pachycephalidae, Psophodidae, Vireonidae, Campephagidae, Rhagologidae, Artamidae, Machaerirhynchidae, Vangidae, Platysteiridae, Aegithinidae, Pityriasidae, Malaconotidae, Rhipiduridae, Dicruridae, Ifritidae, Monarchidae, Platylophidae, Laniidae, Corvidae, Melampittidae, Corcoracidae, Paradisaeidae

Corvoidea is one of the three huge superfamilies of oscines. An extremely diverse group of mostly Australian families, Corvoidea also includes a smaller radiation centered on Africa as well as several families that are of worldwide distribution (Barker *et al.* 2004, Jønsson *et al.* 2011, Fuchs *et al.* 2012, Aggerbeck *et al.* 2014). Within this large and diverse group, relationships are still not well resolved. One of the better-supported clades includes a radiation of largely African birds, sometimes referred to as the subfamily Malaconotoidea (Fuchs *et al.* 2012, Cracraft 2014), which includes the Mottled Whistler, woodswallows and butcherbirds, boatbills, vangas and helmet-shrikes, batises and wattle-eyes, ioras, bristlehead, and bush-shrikes. Another well-supported group, often referred to informally as the "crown corvoids," includes the Ifrita, monarch flycatchers, Shrike-jay, shrikes, crows and jays, melampittas, Australian mudnesters, and birds-of-paradise. Outside of these two large and diverse clades, relationships are less clear (Barker *et al.* 2004, Moyle *et al.* 2006b, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014).



Common Green Magpie, *Cissa chinensis*. Kaeng Krachan NP, Thailand. © Alex Vargas.

# MOHOUIDAE

## New Zealand Creepers

2 genera • 3 species

**Related Families** All the other 29 families in the corvoid radiation.

**Similar Birds** Bushtits (Aegithalidae), warblers (Parulidae, Sylviidae, Phylloscopidae, Cisticolidae), tits (Paridae)

**Description**

- Plumage brown-backed with yellow, white, or gray and brown on head and underparts
- Wings short, rounded; tail medium length
- Body small, ovoid, generally held horizontal
- Bill short to medium; medium-stout
- Head large; neck short, thick
- Legs and feet medium-long and thick
- Females very slightly duller than males

**Habitat** Mohouids live mainly in native forest, from sea level to high-elevation montane scrub.

**Food** These birds feed mainly on insects and other small arthropods, but also take fruit and seeds. They forage mainly by gleaning from leaves and twigs or by probing holes and crevices in bark and branches.

**Breeding** Mohouids are monogamous with biparental care. The Whitehead *Mohoua albicilla* and Yellowhead *M. ochrocephala* are cooperative breeders, with Whiteheads having up to six helpers attending a nest. Nests, built by females, are deep cups made of rootlets, tendrils, leaves, grasses, and bark. The outside of the nest is covered with spiderwebs, and the inside is lined with moss, wool, feathers, and bark. The Whitehead and Pipipi *M. novaeseelandiae* nest close to the ground in small trees or shrubs, placing their nests in the fork of a branch or tangle of vines, whereas the Yellowhead nests in a cavity in live or dead trees. Female mohouids lay 2 to 4 eggs; they alone incubate, but are fed by the males at times. Both male and female, and any helpers that are present, help to feed nestlings. Incubation takes about 19 to 21 days, and the chicks fledge after about 20 to 22 days in the nest. The fledglings are fed for at least a few days, but for several weeks in the non-cooperative Pipipi.

**Conservation** Habitat loss and the effects of introduced predators are the major threats facing the single mohouid species (33%) that



Pipipi, *Finschia novaeseelandiae*.
Codfish Island, New Zealand. © Simon Fordham / NaturePix.



These energetic small songbirds flit about forest and scrub habitats, usually in groups and sometimes hanging upside down, in search of insect prey. Only recent molecular analyses have revealed how distinctive and ancient their ancestry is. Like so many birds in the region, two of the three species are cooperative breeders. Endemics to New Zealand, the mohouids have long contended with being the sole hosts of an endemic brood-parasitic cuckoo, but it is anthropogenic changes, including the clearing of land and depredations of introduced stoats and rats, that have caused dramatic declines in their populations and constrictions of their ranges.



Yellowhead, *Mohoua ochrocephala*. Ulva Island, New Zealand. © Simon Fordham / NaturePix.



Whitehead, *Mohoua albicilla*. Tiritiri Matangi Island, New Zealand. © Rob Hutchinson / Birdtour Asia.

is of conservation concern (1 EN). The endangered Yellowhead experienced rapid declines following logging and the introduction of stoats and rats to the South Island. The Pipipi and Whitehead, which are still widely distributed across the South and North Islands, respectively, are not at immediate risk although they appear to be declining.

Relationships Mohouidae is part of the superfamily Corvoidea of oscine passerines. Mohouids have long been considered to be part of the whistlers (Pachycephalidae), on the basis of both DNA-DNA hybridization work and morphology, but much recent work investigating the relationships and evolutionary history of Corvoidea has shown that they are only very distantly related to the whistlers. Mohouidae instead appears to represent an ancient lineage that split off early from the rest of Corvoidea, and does not appear to have any strongly supported close relationship to any single family in the clade (Norman *et al.* 2009, Jønsson *et al.* 2011, Aidala *et al.* 2013, Aggerbeck *et al.* 2014).

*Mohoua*
2 species



*M. albicilla*
Whitehead

*Finschia*
1 species



*F. novaeseelandiae*
Pipipi

# EULACESTOMIDAE
## Wattled Ploughbill

1 genus - 1 species

**Related Families** Other corvoid families, perhaps especially Psophodidae (whipbirds), Neosittidae (sittellas)

**Similar Birds** New Zealand wattlebirds (Callaeidae), whistlers (Pachycephalidae), Prong-billed Barbet (Semnornithidae), euphonias (Fringillidae), antbirds (Thamnophilidae)

**Description:**
- Plumage drab olive-brown with black accents on wings and breast
- Wings and tail medium-short
- Body small, compact ovoid
- Bill deep, laterally compressed, hooked
- Head large, with pink, round, fleshy wattles in males; neck short, thick
- Legs and feet medium-large
- Female duller than male, lacks wattles and black in plumage

**Habitat** The Wattled Ploughbill lives in montane forest with thick undergrowth, especially in and near thickets of climbing bamboo.

**Food** Wattled Ploughbills feed mostly on insects gleaned from branches and leaves. They also use their bills to pry and dig into bark and moss, stripping it away from twigs and branches in search of prey.

**Breeding** Although very little is known about the breeding biology of this species, it is presumed to be monogamous with biparental care; there is a single report of male incubation. Nothing is known of its clutch size, nest, or parental care.

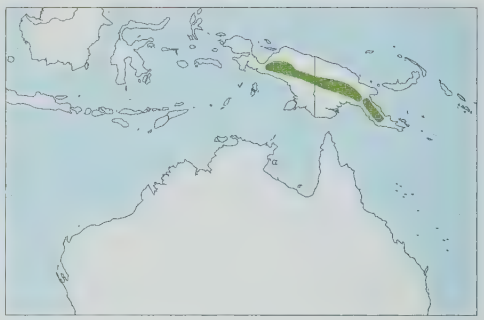
**Conservation** The Wattled Ploughbill faces no immediate conservation concerns.

**Relationships** Eulacestomidae is part of the corvoid superfamily radiation of oscine passerines. However, the Wattled Ploughbill has long been a taxonomic enigma. Although it has most often been placed in Pachycephalidae for lack of a better place, recent genetic work has begun to shed light on its relationships with other birds. Though part of Corvoidea, the Wattled Ploughbill is not clearly sister to any single group of birds. One study with relatively light taxonomic sampling placed it sister to Psophodidae (Dumbacher *et al.* 2008), but another with more extensive sampling found it either sister to a huge swath of corvoids including drongos, jays, shrikes, and fantails (Jønsson *et al.* 2011) or sister to Neosittidae (Aggerbeck *et al.* 2014). Clearly, the true relationships of this distinctive bird are still unclear, and it appears that the Wattled Ploughbill is an old lineage with no close living relatives in Corvoidea.



Wattled Plougbill, *Eulacestoma nigropectus*.
Kumul Lodge, Papua New Guinea. © Maxime Aliaga.



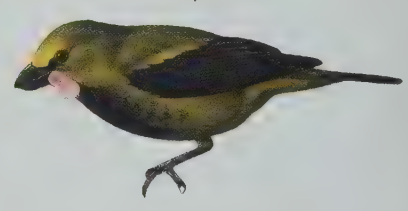


The Wattled Ploughbill *Eulacestoma nigropectus*, whose generic name means "ploughshare-bill," is an enigmatic songbird from the highlands of New Guinea. With two large, pink, round wattles below its oddly shaped bill, the male of this species is hard to mistake for any other. These ploughbills are active foragers that often join mixed-species foraging flocks, foraging on all sides of branches and branchlets as they search for insects. Perhaps surprisingly, their song is a long, high, ringing whistle. Essentially nothing is published about the breeding biology of the Wattled Ploughbill, and there are few birds so odd about which so little is known.



Wattled Plougbill, *Eulacestoma nigropectus*. Pigites Trail, Enga Province, Papua New Guinea. © Erik Enbody.

*EULACESTOMA*
1 species



*E. nigropectus*
Wattled Ploughbill

Passeriformes, Corvoid Oscines

# NEOSITTIDAE
## Sittellas

1 genus · 2 species

**Related Families** Other corvoid families, perhaps especially Eulacestomidae (Wattled Ploughbill)

**Similar Birds** Nuthatches (Sittidae)

**Description**
- Plumage all black with pink in face, or a combination of black, gray, and white in solid patches and streaking, with white or cinnamon wing bar
- Wings medium-long, rounded; tail short
- Body very small, cylindrical ovoid, with posture horizontal to substrate
- Bill medium length, thin, very slightly recurved
- Head medium-sized; neck short, thick
- Legs medium length, thin; toes thin but long with long, curved claws
- Slight differences in plumage between male and female

**Habitat** The sittellas occupy a variety of forested and woodland habitats, ranging from montane rainforest in New Guinea to more arid acacia scrubland and open woodland.



Varied Sittella, *Daphoenositta chrysoptera*.
Timber Creek, Northern Territory, Australia. © Drew Fulton.



**Food** The sittellas are primarily insectivorous, consuming particularly large numbers of insect larvae. They move up and down tree trunks and branches in search of their insect prey, gleaning them from the branch surface or from furrows in bark, and sometimes from foliage; occasionally they sally after a passing insect. Sittellas prefer eucalyptus trees with stringy bark for foraging, and there is anecdotal evidence that they use tools to extract larvae from trees.

**Breeding** The sittellas are monogamous and breed cooperatively, in groups that contain up to seven helpers. They also are occasionally plural breeders, with two pairs in a group having separate nests in a large group territory, the young in both nests attended by all group members. And in some cases, two females will lay in the same nest, even incubating side-by-side. Sittella nests are cup- or tube-shaped structures built primarily of shredded bark with smaller amounts of fur and plant down secured together by spiderwebs. Nests are typically placed in the vertical fork of a branch, usually a dead one, and are decorated on the outside with flakes of bark and lichen, making them extremely well-camouflaged. Typically, females lay 2 or 3 eggs. All members of the group help with nest construction, but only the breeding female incubates. The breeding male and the rest of the group feed the female while she incubates, and all group members help feed the young once they hatch. Incubation takes a surprisingly long 19 to 20 days, and the nestlings do not leave the nest until they are 18 to 20 days old. They are fed for up to 80 days post-fledging,

**Conservation** There are no immediate conservation concerns for the sittellas.

**Relationships** Neosittidae (also formerly called Daphoenosittidae) is in the superfamily Corvoidea of oscine passerines. Sittellas were once placed with Sittidae because of their convergent behavioral similarities, and later with Timaliidae *sensu lato*, but recent molecular phylogenetic studies suggest instead that the sittella lineage diverged near the base of Corvoidea (Barker *et al.* 2004, Reddy & Cracraft 2007, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014). One recent study suggests a sister relationship with Eulacestomidae (Aggerbeck *et al.* 2014), with both together in turn sister to a large group of other corvoid lineages. Other studies have been unable to recover any well-supported relationship of the sittellas, suggesting only that they are an ancient lineage within the corvoids (Norman *et al.* 2009, Jønsson *et al.* 2011).



Varied Sittella, *Daphoenositta chrysoptera*. Cooltong Conservation Park, Riverland, South Australia. © Drew Fulton.

These short-tailed, light-limbed songbirds commute up and down branches and tree-trunks in a series of short hops in a manner that recalls nuthatches (Sittidae) of the Northern Hemisphere. Yet they move with an agility and lightness of grip that their Northern Hemisphere counterparts lack, and, with bills that are thinner and less substantial than those birds of the north, they seldom, if ever, crack seeds. They nest in a cup or tube built of spiderwebs, expertly camouflaged by the application of chips of bark and lichen from the surrounding trees to make the structure seem like a natural extension of the branch on which it lies. The most widespread species comprises a set of subspecies with more plumage variation than in almost any other songbird.

*DAPHOENOSITTA*
2 species



*D. miranda*
Black Sittella

# ORIOLIDAE
## Old World Orioles

3 genera • 32 species

**Related Families** Paramythiidae (painted berrypeckers), Psophodidae (whipbirds), Vireonidae (vireos), Pachycephalidae (whistlers)

**Similar Birds** New World orioles (Icteridae), whistlers (Pachycephalidae), cuckoo-shrikes (Campephagidae)

**Description**
- Plumage often bright with large patches of yellow, red, or green contrasting with black head or mask, but some birds plain brown
- Wings long, pointed; tail medium length
- Body medium-sized; cylindrical ovoid
- Bill straight, pointed, moderately deep and slightly inflated, slightly hooked in some; pink or black
- Head small to medium
- Legs and feet short, thick
- Females usually browner with lighter breast and strong brown streaking

**Habitat** Orioles live in wooded habitats, from wet rainforest to city parks to arid open savanna woodlands.

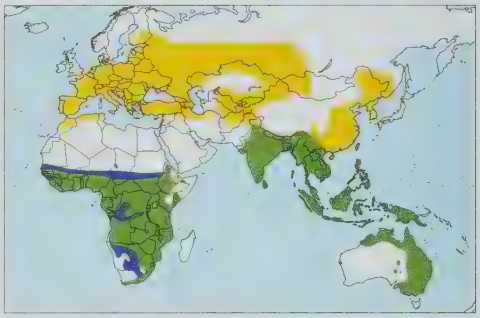
**Food** Orioles feed on an assortment of foods, including berries, other fruits, invertebrates, and, occasionally, small vertebrates. Figbirds (*Sphecotheres*) feed primarily on fruits. Detailed studies at the nest indicate that orioles mostly feed insects to nestlings.

**Breeding** Orioles and figbirds are monogamous with biparental care. They build cup nests that are suspended by the rim from the fork of a branch. Nests of orioles are constructed of grasses, rootlets, and other plant materials that are woven together and around the supporting branches of the tree, with saliva sometimes used to soften and adhere the first fibers to the supporting branch. Figbird nests are more loosely made of less-pliable twigs but still woven around supporting branches. Female oriolids typically lay 1 to 6 six eggs, most commonly 2 or 3. In most instances, the female is the only member of the pair to build the nest and incubate the eggs, although both sexes incubate in some species. Incubation takes two to three weeks, as does the development of the chicks in the nest. Both sexes feed the young, and the young are



Black-and-crimson Oriole, *Oriolus cruentus*. Fraser's Hill, Pahang, Malaysia. © Con Foley.





The oriolids are songbirds of Old World forests, woodlands, and gardens. They share a generally upright carriage and a masked or hooded appearance, a fondness for fruit as at least part of their diet, and a woven nest suspended from a fork in a tree branch. For protection from predators, these nests are sometimes built near the nest of a more-aggressive drongo or butcherbird or, in figbirds, near others of their own kind in a loose colony. Most of the species have songs that include rich, whistled flute-like notes, and the name oriole seems likely to have been onomatopoeic for the "o-ri-ole" call of the widespread Eurasian species in this family.



Black-naped Oriole, *Oriolus chinensis*. Nakhon Nayok, Thailand. © Alex Vargas.

fed by the parents for another few weeks or so after fledging.

**Conservation** Habitat destruction is taking its toll on rainforest orioles; six species (19%) are of serious conservation concern (3 NT, 1 VU, 1 EN, 1 CR), and two (the recently added piopios of New Zealand) went extinct in the 20th century. The critically endangered Isabela Oriole *Oriolus isabellae* is restricted to sparse lowland forest fragments on a single island in the Philippines, and estimates of remaining global population size are as low as 50 to 250 individuals. The endangered Silver Oriole *O. mellianus*, which has a restricted breeding range in the forests of southern China and migrates to a small wintering range in Thai and Cambodian forests, is threatened by forest conversion on both ends of its journeys. In other orioles the threat of habitat conversion is compounded by very restricted ranges.

**Relationships** The Old World orioles are part of the corvoid radiation of oscine passerines. The position of the Old World orioles within this large radiation, however, has been difficult to determine. Some studies suggest that Oriolidae groups together with families including Corvidae, Laniidae, and Dicruridae, though these relationships are not strongly supported (Fuchs *et al.* 2007b, Irestedt & Ohlson 2008, Norman *et al.* 2009). Other recent studies have suggested a close relationship with Paramythiidae (Barker *et al.* 2004, Aggerbeck *et al.* 2014), Vireonidae (Jønsson *et al.* 2011), or Pachycephalidae (Jønsson *et al.* 2008a, Zuccon & Ericson 2012), with the most recent study suggesting that orioles belong in a clade with Paramythiidae, Vireonidae, and Psophodidae (Aggerbeck *et al.* 2014). Within Oriolidae, there are four recognized subfamilies, only three of which are extant. The *Turnagra* piopios of New Zealand, two puzzling passerines that went extinct in the 1900's, had been placed in six different passerine families in the past, though two molecular studies place them within Oriolidae (Johansson *et al.* 2011, Zuccon & Ericson 2012). The relationships among the remaining subfamilies have not been resolved (Jønsson *et al.* 2010a, Jønsson *et al.* 2011). It is now agreed that *Pitohui dichrous* and *P. kirhocephalus*, two species of pitohuis that used to be classified with Pachycephalidae, belong in Oriolidae. (Jønsson *et al.* 2010a, Johansson *et al.* 2011, Jønsson *et al.* 2011, Zuccon & Ericson 2012).



Australasian Figbird, *Sphecotheres vieilloti*. Near Cooktown, Queensland, Australia. © Jon Irvine.

### Subfamily **PITOHUINAE**

*PITOHUI*
2 species



*P. dichrous*
Hooded Pitohui

### Subfamily **SPHECOTHERES**

*SPHECOTHERES*
3 species



*S. vieilloti*
Australasian Figbird

### Subfamily **ORIOLINAE**

*ORIOLUS*
27 species



*O. oriolus*
Eurasian Golden Oriole

# PARAMYTHIIDAE

## Painted Berrypeckers

2 genera • 2 species

**Related Families** Vireonidae (vireos), Psophodidae (whipbirds), Oriolidae (Old World orioles)

**Similar Birds** Tits (Paridae), tanagers (Thraupidae), euphonias (Fringillidae), cotingas (Cotingidae)

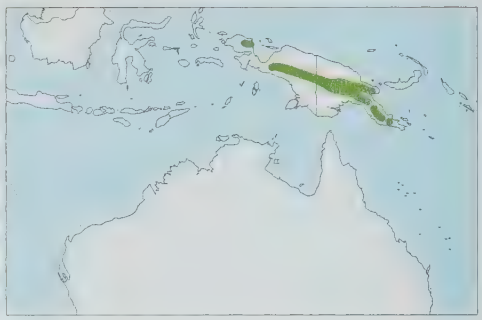
**Description**

- Plumage boldly patterned; olive-green back melded with bold patterns in black, yellow, white, and/or blue-gray
- Wings medium length; tail short to medium-long
- Body small to medium, ovoid
- Bill short to medium, straight, pointed, slightly inflated
- Head large; neck short, thick
- Legs medium-short; feet stout
- Males more brightly colored and boldly patterned in Tit Berrypecker; sexes similar in Crested Berrypecker



Crested Berrypecker, *Paramythia montium*. Kumul Lodge, Papua New Guinea. © Jon Irvine.





**Habitat** Both species of painted berrypecker live in montane forest in New Guinea.

**Food** Painted berrypeckers feed almost entirely on small fruits, especially berries, with *Oreocharis* also feeding on flowers and buds and *Paramythia* feeding occasionally on insects and other small invertebrates.

**Breeding** Almost all we know about the breeding biology of this group is based on studies of the Crested Berrypecker, which is monogamous with biparental care. The bulky cup nest is built mostly of moss, sticks, lichens, rootlets, and stems and placed in the fork of a tree or a bush. Crested Berrypeckers lay single-egg clutches, though a pair of Tit-Berrypeckers has been observed feeding two fledglings, so that species likely lays at least 2 eggs. Only the female incubates the eggs, but both male and female feed the young. Incubation takes at least 12 days, but nothing more is known of the duration of parental care.

**Conservation** There are no immediate conservation concerns for the painted berrypeckers.

**Relationships** The painted berrypeckers are part of the large core corvoid radiation of oscine passerines (Barker *et al.* 2004, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014). They have rarely been sampled in molecular phylogenetic studies, and the existing evidence is conflicting,

Any two species of tropical birds chosen at random will both be woefully understudied, and these two enigmatic endemics of the mountains of New Guinea, aptly named for their bold and colorful plumage, are no exception. With the nest of the Tit-Berrypecker *Oreocharis arfaki* only briefly described, and the Crested Berrypecker *Paramythia montium* only a little better known, we still have much to learn about both. We do know that, although these species eat mostly berries, their diets seem to be a bit more diverse. The fact that Crested Berrypeckers have been seen to pluck large ericaceous flowers and smear themselves with them suggests that some of the discoveries to be made may be sweet indeed.



Tit Berrypecker, *Oreocharis arfaki*. Angi, Papua New Guinea. © Nik Borrow.

with two studies suggesting a sister relationship with Oriolidae (Barker *et al.* 2004, Driskell *et al.* 2007), while another, more recent study suggested that they are instead sister to Psophodidae (Jønsson *et al.* 2011). The most recent study to include Paramythiidae reports them as sister to a clade made up of Vireonidae and Psophodidae (Aggerbeck *et al.* 2014).



Crested Berrypecker, *Paramythia montium*. Kumul Lodge, Papua New Guinea. © Maxime Aliaga.

*PARAMYTHIA*
1 species

*P. montium*
Crested Berrypecker

*OREOCHARIS*
1 species

*O. arfaki*
Tit Berrypecker

# OREOICIDAE

## Australo-Papuan Bellbirds

3 genera • 3 species

**Related Families** Oriolidae (Old World orioles), Paramythiidae (painted berrypeckers), Pachycephalidae (whistlers), Rhagologidae (Mottled Whistler), Campephagidae (cuckoo-shrikes), Malaconotidae (bush-shrikes), Artamidae (woodswallows and butcherbirds), Cinclosomatidae (quail-thrushes), Falcunculidae (Shrike-tit)

**Similar Birds** Whistlers (Pachycephalidae), brushfinches (Passerellidae)

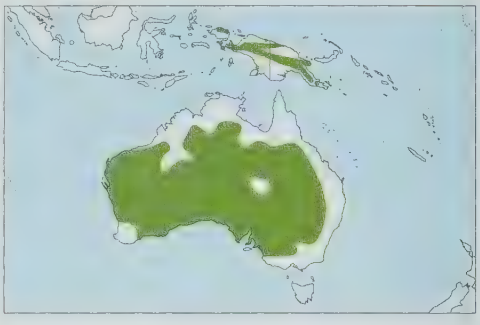
**Description**

- Plumage brown, olive, or gray above, and brown or contrasting pattern of white and black or yellow in underparts
- Wings medium to short; tail medium length
- Body medium-sized, ovoid
- Bill medium length, straight, stout, with faint to distinct hook at the tip
- Head large; neck short and thick
- Legs and feet medium-long, medium to thick
- In *Oreoica*, only male has striking pattern in face and breast



Crested Bellbird, *Oreoica gutturalis*. Manmanning, Western Australia. © Graeme Chapman.





**Habitat** Oreoicids live in a variety of wooded habitats, ranging from dry woodlands and forest to primary tropical rainforest, from near sea level to over 3000 m.

**Food** Oreoicids feed primarily on insects, worms, and at least occasional fruits and seeds. They forage on the ground, in undergrowth, and in trees, gleaning and probing for prey items, tending to stay on trunk and larger branches when in trees. At least two species commonly join mixed-species foraging flocks.

**Breeding** Information on the breeding biology of Oreoicidae comes from only two species, which are socially monogamous and appear to have biparental care. These birds construct a deep cup nest in the fork or hollow of a tree, made of a variety of materials, including moss, bark, leaves, and rootlets. It is lined with fine bark strips, grass, and, in *Oreoica*, toxic caterpillars. Females lay 1 to 4 eggs. In *Oreoica* (no information for the other two species) both male and female help construct the nest, incubate the eggs, and feed the chicks, which hatch asynchronously after 14 to 17 days of incubation. Chicks, in the nest for 11 to 12 days, leave the nest fairly young and are fed by the parents for an unknown period afterward.

**Conservation** No oreoicid faces immediate conservation concerns.

A more apt name for these birds might be "ground bellbirds," as all are mid-sized passerines that spend a lot of time on the ground, with songs of rhythmically repeating syllables and rich, ringing whistles connecting with variable amounts of lispy, high twittered notes. The rhythmic quality of the song gave at least one of the species, the Crested Bellbird, its alternative onomatopoeic common names: the aborigines know it as "panpanpanella" and early Europeans called it "dick-dick-the-devil." All three genera were once placed in Pachycephalidae, but various recent molecular analyses have all reached the same conclusion: these three birds are each other's closest relatives, forming a distinct clade that makes more sense as a separate family.



Rufous-naped Bellbird, *Aleadryas rufinucha*. Kumul Lodge, Papua New Guinea. © Nik Borrow.

**Relationships** Oreoicidae, an assemblage of three formerly disparate bird species, is part of the corvoid radiation of passerine birds. Until recently, these three species had been placed in the Pachycephalidae. However, recent molecular phylogenetic evidence indicates that the Crested Bellbird *Oreoica gutturalis*, Rufous-naped Bellbird *Aleadryas rufinucha*, and Crested Pitohui *Ornorectes cristatus* group together, as sister to Pachycephalidae (Dumbacher *et al.* 2008), as sister to Oriolidae plus Paramythiidae (Barker *et al.* 2004), as sister to Rhagologidae plus Campephagidae (Jønsson *et al.* 2008a), as sister to these same two families plus Malaconotidae and Artamidae (Norman *et al.* 2009), or as sister to Cinclosomatidae and Falcunculidae (Aggerbeck *et al.* 2014). Clearly, the affinities of this small group of birds are not yet very clear.



Crested Bellbird, *Oreoica gutturalis*. Kilcowera Station, Queensland, Australia. © Nevil Lazarus.

*ALEADRYAS*
1 species



*A. rufinucha*
Rufous-naped Bellbird

*ORNORECTES*
1 species



*O. cristatus*
Crested Pitohui

*OREOICA*
1 species



*O. gutturalis*
Crested Bellbird

# CINCLOSOMATIDAE
## Quail-thrushes

2 genera • 9 species

**Related Families** Paramythiidae (painted berrypeckers), Psophodidae (whipbirds), Falcunculidae (Shrike-tit)

**Similar Birds** Babblers (Timaliidae), logrunners (Orthonychidae), Rail-babbler (Eupetidae), thrushes (Turdidae)

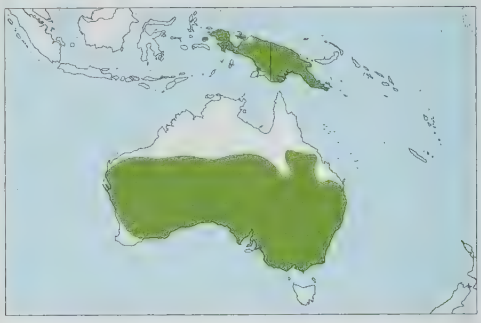
**Description**

- Plumage dominated by earth tones in *Cinclosoma* species and blue in *Ptilorrhoa* species, with contrasting black and white and gray patterns in face and often much of upperparts
- Wings short, rounded; tail long, graduated, rounded, with long undertail coverts, especially in *Cinclosoma*
- Body medium-sized; elongate cylindrical ovoid; often held horizontal
- Bill medium to medium-long, straight, thin
- Head small; neck medium-long
- Legs and feet short, thick in *Cinclosoma* and thinner in *Ptilorrhoa*
- Males more boldly patterned in most species



Spotted Quail-thrush, *Cinchlosoma punctatum*.
Brindabella Range, New South Wales, Australia. © D. W. Winkler.





**Habitat** Quail-thrushes mainly inhabit dry woods, arid scrubland, and open arid plains. Jewel-babblers, by contrast, prefer dense, wet forests in New Guinea, ranging from lowlands well up into the mountains.

**Food** Cinclosomatids feed primarily on small invertebrates and seeds. They typically forage on the ground, walking slowly while turning over leaf litter and digging in the soil with their bills. Large insects are held down with one foot while they are picked apart.

**Breeding** Surprisingly little is known about the breeding biology of cinclosomatids, and *Ptilorrhoa* species are the most poorly known. Quail-thrushes are monogamous with biparental care, likely with cooperative breeding. They build simple, loose cup nests on the ground from grasses, twigs, and bark. Jewel-babblers, in their wetter habitats, use palm fronds and other jungle vegetation in their nests. Females typically lay 1 to 3 eggs, with 2 eggs being typical in most species. The female constructs the nest alone. In most cases, only the female incubates the eggs, although in some species, the male may also incubate. The incubation period is about 14 days, and the chicks leave the nest after about two weeks. Both male and female feed the chicks, but nothing is known, apparently, about post-fledging parental care.

Quail-thrushes are masters of moving swiftly and quietly through the undergrowth, sometimes popping up in unexpected places to check on human interlopers. Although they are most comfortable and competent on the ground, even building their cup nests there, they will take to the branches to sing. All resemble thrushes in shape, and perhaps also in their patterned, earth-toned plumage (though the jewel-babblers liven their plumage with swaths of rich deep blue), but they have longer tails, shorter legs, and smaller heads, lending them a distinctive sleek and low-to-the-ground appearance. Their songs are high repeated whistles, so rapid sometimes as to be trills, and often with the strident quality of the sound of grinding metal or insect calls.



Spotted Quail-thrush, *Cinclosoma punctatum*. Lamington NP, Queensland. © Graeme Chapman.

**Conservation** The cinclosomatids face no immediate conservation concerns.

**Relationships** Cinclosomatidae is part of the corvoid clade of oscine passerines, where it belongs in an early part of the radiation (Barker *et al.* 2004, Jønsson *et al.* 2007, Irestedt & Ohlson 2008, Norman *et al.* 2009, Jønsson *et al.* 2011). Like many birds in this group, the relationships of this family have been difficult to place. The studies with the broadest taxonomic sampling of Corvoidea suggest a sister relationship for Cinclosomatidae with a clade made up of Paramythiidae and Psophodidae (Jønsson *et al.* 2011), or with Falcunculidae (Aggerbeck *et al.* 2014).



Cinnamon Quail-thrush, *Cinclosoma cinnamomeum*. Near Sturt NP, New South Wales, Australia. © Nevil Lazarus.

*PTILORRHOA*
4 species



*P. caerulescens*
Blue Jewel-babbler

*CINCLOSOMA*
5 species



*C. ajax*
Painted Quail-thrush

# FALCUNCULIDAE
## Shrike-tit

1 genus • 1 species

**Related Families** Pachycephalidae (whistlers) · Cinclosomatidae (quail-thrushes) · Psophodidae (whipbirds) · Eulacestomidae (Wattled Plough-bill)

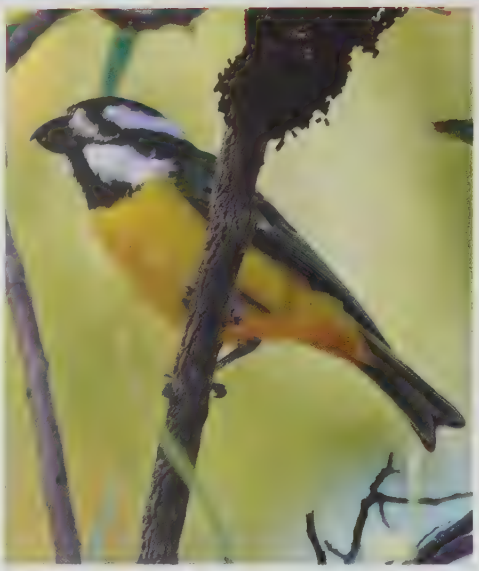
**Similar Birds** Whistlers (Pachycephalidae) · bush-shrikes (Malaconotidae) · shrike-vireos (Vireonidae)

**Description**
- Plumage with greenish back, black-and-white stripes on head, and bright yellow breast and belly; distinct puffy crest
- Wing and tail medium length
- Body medium-sized, ovoid
- Bill medium-short, deep, hooked
- Head large, neck short
- Legs and feet medium-short, thick
- Female with olive, not black, in throat, and slighter bill

**Habitat** The Shrike-tit inhabits primarily forests and woodlands, occasionally scrub and parks and developed areas, up to about 1200 m elevation.

**Food** Shrike-tits mainly feed on insects and other invertebrates, with occasional fruit and seeds. They use their powerful bill to pry bark from the trunk and branches of trees in search of prey and also glean insects from branches, breaking into insect galls and sometimes using twigs as tools to extract insects from crevices in bark and branches.

**Breeding** Shrike-tits are usually monogamous with biparental care, but they occasionally have an auxiliary bird helping with parental care. The female generally constructs the nest, a deep cup of bark placed well up in a tree, camouflaged on the outside with spiderweb, lichens, and moss and lined with fine bark or grass. The clutch is of 2 or 3 eggs. The female does the bulk of incubation, assisted at times by the male, and both sexes, and any auxiliary present, feed the chicks. Incubation takes 18 to 20 days, and the nestlings leave the nest after 15 to 21 days. The young are fed by the adults for up to six months after fledging.

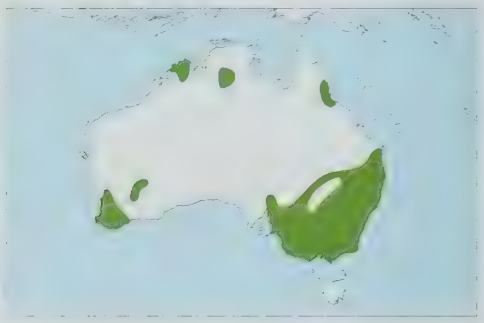


Shrike-tit, *Falcunculus frontatus*. Warloch Ponds, Northern Territory, Australia. © Rob Hutchinson / Birdtour Asia.

**Conservation** The Shrike-tit faces no immediate conservation concerns.

**Relationships** The Shrike-tit is part of the corvoid radiation. Historically, the Shrike-tit has been placed in several different families, most recently in Pachycephalidae. Recent work using DNA sequence data, however, has cast doubt on the Shrike-tit's relationship with the rest of the whistlers. While some work has supported this affinity (Jønsson *et al.* 2011, Aidala *et al.* 2013), Aggerbeck *et al.* (2014) found Falcunculidae to be sister to Cinclosomatidae, and only more distantly related to Pachycephalidae, and Dumbacher *et al.* (2008) found Falcunculidae to be sister to a clade made up of Psophodidae and Eulacestomidae, albeit with weak support. Given this inability to place the Shrike-tit with any certainty, we place it in its own monotypic family, following Christidis and Boles (2008).





Three different races of this distinctive Australian songbird occupy the three corners of the continent (NW, SW, and SE) that support open, seasonally dry woods. One of the many Australian birds that English settlers named after their more familiar British birds, this bird does indeed have the large head and heavy hooked bill of a shrike. Colored like a large tit, it also forages like one, actively gleaning insects from branches and leaves and often using its formidable bill to tear bark apart in search of prey. With a high whistled long-toned song that is characteristic of so many Australasian corvoids, Shrike-tits also have soft jay-like contact calls that the pair members give to each other and their offspring.



Shrike-tit, *Falcunculus frontatus*. Sundown NP, Queensland, Australia. © Graeme Chapman.

*FALCUNCULUS*
1 species



*F. frontatus*
Shrike-tit

Passeriformes, Corvoid Oscines

# PACHYCEPHALIDAE
## Whistlers

5 genera • 43 species

**Related Families** Oriolidae (Old World orioles), Vireonidae (vireos), Oreoicidae (Australo-Papuan bellbirds), Cinclosomatidae (quail-thrushes), Falcunculidae (Shrike-tit), Dicruridae (drongos), Monarchidae (monarch flycatchers), Corvidae (crows and jays)

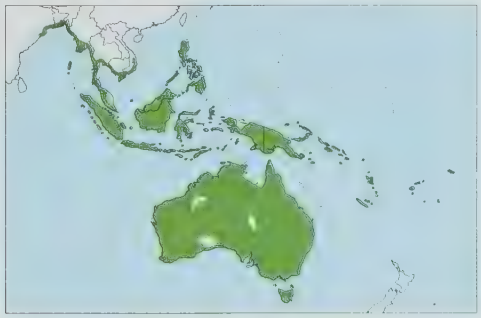
**Similar Birds** Whipbirds and allies (Psophodidae), babblers (Timaliidae), thrushes (Turdidae), honeyeaters (Meliphagidae), tanagers (Thraupidae)

**Description**
- Plumage mostly fairly dull brown or gray, enlivened in some species with contrasting patterns in black, especially around the face and breast, on a background of white or yellow
- Wings and tail medium length
- Body size medium; shape ovoid
- Bill medium to medium-long, medium-stout
- Head large, rounded; neck short, thick
- Legs short; feet short, and thick in some
- Females less brightly colored or boldly patterned, and often streaked below



Golden Whistler, *Pachycephala pectoralis*.
Mount Lewis NP, Queensland, Australia. © Drew Fulton.





**Habitat** The pachycephalids live mainly in forested habitats, from rainforests to open Australian scrub habitats.

**Food** Pachycephalids feed primarily on insects and other invertebrates. Larger species, particularly the shrike-thrushes, take small vertebrates such as frogs and lizards. Members of this family also take fruit, which can make up a substantial portion of the diet of some species. *Pachycephala* species forage mostly in trees, gleaning insects from branches and hawking them in the air, whereas *Colluricincla* species forage mostly on the ground for insects and other invertebrates.

**Breeding** The pachycephalids are monogamous with biparental care, and unusually for passerines in this region, cooperative breeding in this group apparently has not been reported. The nest is typically cup-shaped, most often placed in the horizontal fork of a branch, but also, in some shrike-thrushes, in adopted cavities or on the ground. The nest is typically constructed of twigs, grasses, bark, and leaves, often being lined with rootlets or other fine material. Spiderwebs may be used to attach the nest to branches. Females typically lay 2 or 3 eggs. In most species studied, both male and female are active in nest construction, incubation,

This diverse group of big-headed, heavy-shouldered songbirds is largely limited to the Australo-Papuan region, with only three species making it across Wallace's Line into Borneo, the Philippines, and the west coast of Southeast Asia. The gray and brown shrike-thrushes, the plainest members of this family, have some of the most beautiful songs in all the world, their haunting, strong, and ethereal whistles making the dawn choruses in their home region as moving, and recognizable, as those anywhere. For an as yet unknown reason, these birds have a simpler social behavior than most corvoids, and as far as we can tell, cooperative breeding has not yet been reported in this group.



Rufous Whistler, *Pachycephala rufiventris*. Alpha, Queensland, Australia. © B. G. Thomson.

and feeding the chicks. Incubation takes 15 to 19 days, and the nestlings leave the nest after about 10 to 12 days. They appear to be cared for by both parents for at least two months after fledging.

**Conservation** Pachycephalids face the same challenges from habitat conversion and introduced species as other passerines in their range, and four species (9%) are at risk (3 NT, 1 CR). All these four have very limited ranges. The Red-lored Whistler *Pachycephala rufogularis* is restricted to a small area of southern Australia, where much of its dry woodland habitat has been cleared and that remaining is threatened by wildfire; the White-bellied Pitohui *Pseudorectes incertus* is known from only two very small and isolated tracts of lowland forest in New Guinea; and the Tongan Whistler *Pachycephala jacquinoti* occupies very limited habitat in its remote island range, compounded by pressure from introduced rats and ungulates. The most endangered pachycephalid of all is the Sangihe Shrike-thrush *Colluricincla sanghirensis*. Limited to threatened forest fragments on a single small island north of Sulawesi, this bird was known from only two 19th century specimens until it was rediscovered in 1985. Subsequent searches indicate that fewer than 100 birds may remain.

**Relationships** The whistlers are part of the corvoid radiation of oscine passerines. Within the corvoid radiation, there have been many hypothesized positions for the whistlers, with no clear consensus. Two studies indicate polytomies including a broad variety of other corvoid families (e.g., Irestedt & Ohlson 2008, Jønsson *et al.* 2008a). Those less ambiguous studies suggest a sister relationship with Falcunculidae (Norman *et al.* 2009, Jønsson *et al.* 2011), with Oriolidae (Jønsson *et al.* 2008b), with a clade made up of Falcunculidae and Cinclosomatidae (Barker *et al.* 2004), or with a clade made up of these two plus Oreoicidae (Aggerbeck *et al.* 2014). As with the relative position of the family within Corvoidea, the relationships within Pachycephalidae have also not been well resolved. Of all the families among the core corvoids, Pachycephalidae has probably seen the most change in the last ten years, with some species from the formerly large genus *Pitohui* moved to two other families and the species remaining in Pachycephalidae given new names, and with *Eulacestoma*, *Rhagologus*, *Falcunculus*, *Hylocitrea*, and *Mohoua* species all being removed to their own new monogeneric families, and *Aleadryas* and *Oreoica* placed in the Oreoicidae. This reshuffling has left this family much more coherent and less diverse.



Sandstone Shrike-thrush, *Colluricincla woodwardi*. Wyndham, The Kimberley, Western Australia. © Drew Fulton.



Passeriformes, Corvoid Oscines

# PSOPHODIDAE
## Whipbirds

2 genera • 5 species

**Related Families** Vireonidae (vireos), Paramythiidae (painted berrypeckers)

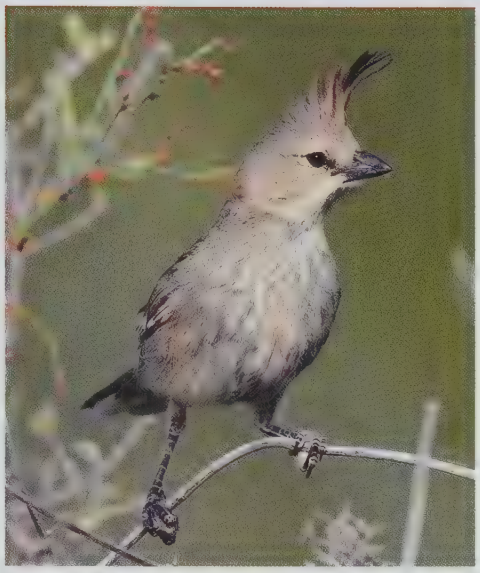
**Similar Birds** Crested Pitohui (Oreoicidae), towhees (Passerellidae), cardinals (Thraupidae and Cardinalidae)

**Description**
- Plumage gray, olive, or brown, usually with some patterning on face and a crest
- Wings short; tail long, graduated
- Body medium-sized, cylindrical ovoid
- Bill medium-short, stout, pointed, very slightly decurved
- Head small to medium; neck medium-short, thick
- Legs and feet medium length and stout
- Sexes similar

**Habitat** Psophodids live in habitats ranging from dense tropical rainforest to arid scrubland.

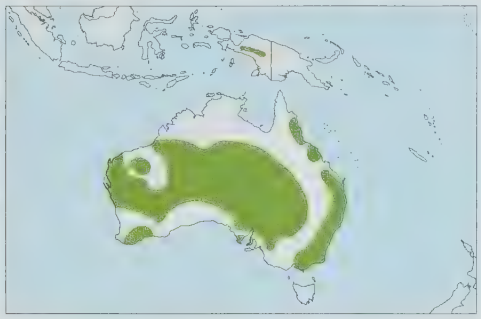
**Food** Most psophodids feed primarily on insects and other invertebrates, including snails. The Eastern Whipbird *Psophodes olivaceus* is by far the best-known species, and it takes occasional seeds, shoots, and fruits. All species spend most of their foraging time on the ground, turning over leaf litter and soil with their bills, but they sometimes wander up into overhanging branches where they glean and probe bark crevices.

**Breeding** Psophodids are monogamous with biparental care. Nests are typically simple cups constructed of grass, twigs, and other plant material. Females typically lay 1 to 3 eggs. Incubation by both sexes, or by female alone, takes 14 to 21 days, and the nestlings leave the nest at 10 to 12 days post-hatch. Both male and female feed the chicks, and they feed the young for at least two months post-fledging.



Chirruping Wedgebill, *Psophodes cristatus*. Tibooburra, New South Wales, Australia. © Graeme Chapman.





**Conservation** Two psophodids (40%) are of conservation concern (1 DD, 1 NT). The data-deficient Papuan Whipbird *Androphobus viridis* is known from only a few widely scattered localities in the mountains of New Guinea, and an informed assessment of its conservations status requires further information. The near-threatened Western Whipbird *Psophodes nigrogularis* is restricted to a few widely scattered localities in southern Australia where much of the arid scrub-woodland it prefers has been cleared and the remaining stands are threatened by wildfire.

The sound of a cracking whip emanating from an Australian garden shrub marks many observers' first encounter with birds in this family. Despite their name, however, some whipbirds don't make this vocalization, and those that do have much more diverse vocal repertoires than is at first apparent. All are mid-sized, rather heavy-bodied songbirds with long tails and earth-toned plumage, and most sport a crest of some sort. In contrast to the multitudes of birds in this region that breed cooperatively, the psophodids, like the pachycephalids, are socially monogamous with simple biparental care. Largely insectivores, the best-known species occasionally eats fruit, first leaning back on tail and belly to transfer the fruit from bill to foot.



Western Whipbird, *Psophodes nigrogularis*. Cheynes Beach, Western Australia. © D. W. Winkler.

**Relationships** The whipbirds and their allies are in the core of the corvoid radiation of oscine passerines (Norman *et al.* 2009). The relationships of the families within this group are not fully resolved, but molecular phylogenetic analyses have shown that Psophodidae is quite distinct from Cinclosomatidae, with which it was previously thought to be allied. It may be sister to Paramythiidae (Jønsson *et al.* 2011) or Vireonidae (Aggerbeck *et al.* 2014).



Eastern Whipbird, *Psophodes olivaceus*. Wollongong, New South Wales, Australia. © Mark A. Chappell.



Passeriformes, Corvoid Oscines

# VIREONIDAE
## Vireos

6 genera • 58 species

**Related Families** Psophodidae (whipbirds), Paramythiidae (painted berrypeckers), Oriolidae (orioles), Corcoracidae (Australian mudnesters)

**Similar Birds** Warblers (Parulidae, Acrocephalidae, Phylloscopidae), white-eyes and yuhinas (Zosteropidae), babblers (Timaliidae)

**Description**
- Plumage dominated by yellow and green, many with eye-ring or eye-stripe
- Wings medium-long, often rounded; tail medium length
- Body small, cylindrical ovoid
- Bill medium length, medium-thick, with slight hook
- Head medium to large; neck short, thick
- Legs and feet short to medium, often thick
- In some species, males more brightly colored

**Habitat** Vireonids live in a diverse array of habitats, ranging from lowland tropical rainforest to coniferous forest and montane cloud forest, from arid scrubland and desert to second-growth old fields.

**Food** Vireos feed on a wide variety of foods, ranging from insects and other invertebrates to small vertebrates, berries, and other fruits. Prey items are usually gleaned from branches and leaves, with fruit plucked and insects occasionally caught in mid-air from a sally. Larger prey items are held down with the feet while they are picked apart. Many species of migratory vireos are insectivorous during the breeding season but rely heavily on fruits during migration and the non-breeding season, with some defending fruiting trees at that time.

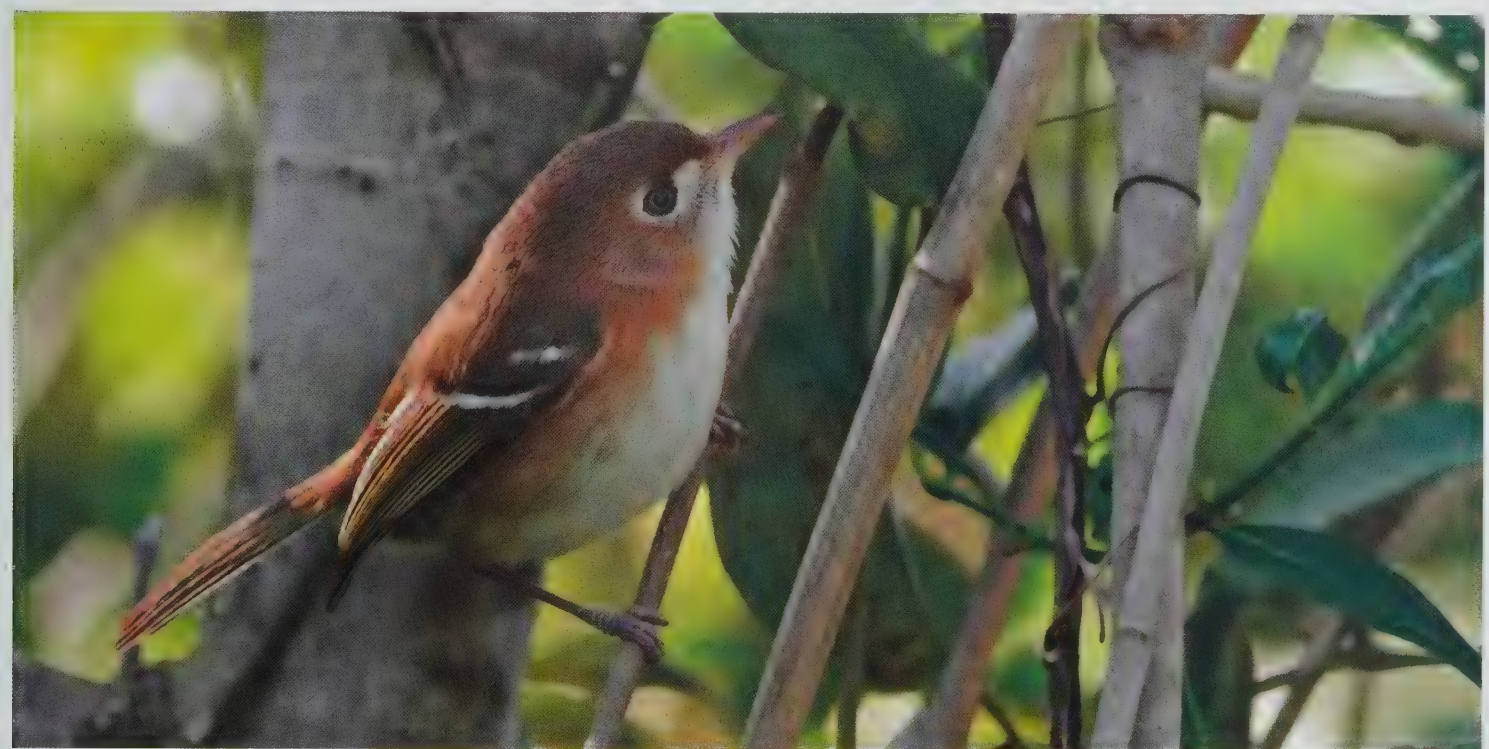


Warbling Vireo, *Vireo gilvus*.
Saskatoon, Saskatchewan, Canada. © Nick Saunders.



**Breeding** Vireos are monogamous with biparental care. Nests of vireos appear to be relatively conserved across the family, even in the Old World species, almost always being cups that are cradled and suspended between two horizontal forked branches. This cup is typically built of rootlets, plant fibers, lichens, moss, and bark, and is lined with spiderwebs and silk, which also help attach it to branches. Vireos typically lay 1 to 5 eggs. Both sexes are active in nest construction, incubation of eggs, and feeding the chicks. However, females typically spend more time incubating the eggs than do males. Incubation takes 13 to 15 days, and the chicks fledge in 10 to 14 days.

Until recently, vireos were a biogeographic puzzle, their relations with the Old World corvoids proving hard to reconcile with their striking diversity and apparent endemism in the New World. This paradox has recently been resolved by molecular data, which showed that the *Pteruthius* shrike-babblers and the monotypic genus *Erpornis* of southern Asia are actually vireonids after all. These are all small, big-billed, arboreal birds of woodlands and forests, with many of the North American species known for their indefatigable all-day singing. For some as yet unknown reason, several species have distinctive colors of the feet and legs, blue in many species of the Western Hemisphere and pink in some from Asia.



Cozumel Vireo, *Vireo bairdi*. Cozumel Island, Quintana Roo, Mexico. © Ian Davies.



Lemon-throated Leaf Tyrant *Tyrannulet ambulans* Cuenca Province, Ecuador. Photo: Jeff van Fleteren

Conservation: Of the 51 species (10%) considered to be threatened, habitat destruction, compounded by restricted ranges (3 EX, 7 CR, 14 EN, 26 VU). The endangered Chivi Vireo *Vireo masteri* is limited to a narrow band of cloud forest along the Pacific slope of the Andes in Colombia and is thought to be undergoing serious declines due to logging. The vulnerable Black-capped Vireo *V. atricapilla* breeding in the USA only in a restricted locality in Oklahoma and Texas has experienced declines from fire suppression, abandoned pasture and land conversion for agriculture. The vulnerable San Andres Vireo *V. caribaeus* and the near threatened Blue Mountain Vireo *V. osburni* and Hispaniolan Vireo *V. gracilirostris* all have restricted island ranges making them especially at risk to ongoing habitat changes. Brood parasitism by the expanding native Brown-headed Cowbird *Molothrus ater* has further added to the population declines of both *V. atricapilla* and the near threatened Bell's Vireo *V. bellii*.

Relationships: Vireonidae is in the corvoid radiation of oscines, but its exact placement within this group remains uncertain. The vireos may have diverged early in the corvoid radiation (Barker *et al.* 2004, Reddy & Cracraft 2007), or Vireonidae may be sister to Oriolidae (Jønsson *et al.* 2011) or sister to Corvoidea (Zuccon & Ericson 2012). The most recent study found Vireonidae to be sister to Psophodidae, and they together were in turn sister to Paramythiidae, then Oriolidae (Aggerbeck *et al.* 2014). The vireos were long thought to be a family endemic to the New World, but recent molecular studies show that two distinct groups of South Asian birds—the Erpornis *Erpornis zantholeuca* and the shrike babblers (genus *Pteruthius*)—are vireonids, not timaliids (Cibois 2003, Barker *et al.* 2004, Reddy & Cracraft 2007, Zuccon & Ericson 2012, Slager *et al.* 2014). Of these, *Erpornis* appears to be sister to the New World species, and *Pteruthius* is sister to all of the other vireonids (Reddy 2008).


















Passeriformes, Corvoid Oscines

# CAMPEPHAGIDAE
## Cuckoo-shrikes

11 genera • 82 species

**Related Families** Artamidae (woodswallows and butcherbirds), Malaconotidae (bush-shrikes), Vangidae (vangas), Platysteiridae (batises and wattle-eyes), Machaerirhynchidae (boatbills), Aegithinidae (ioras), Pityriasidae (Bristlehead), Rhagologidae (Mottled Whistler)

**Similar Birds** Cuckoos (Cuculidae), whistlers (Pachycephalidae), orioles (Icteridae)

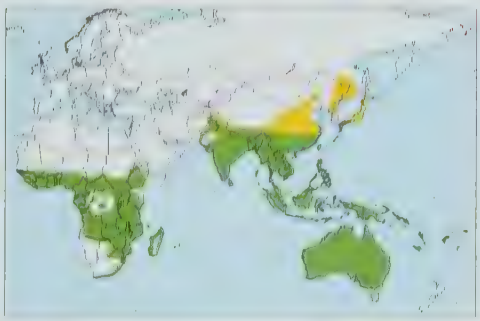
**Description**

- Plumage most often gray or black and white, with predominant yellow, orange, scarlet, rufous, or blue in some species; most often appearing masked or hooded; some species strongly barred below
- Wings medium-long; tail long, often graduated, with spine-like rump feathers in many species
- Body small to medium-large, cylindrical ovoid
- Bill medium length, usually inflated and slightly hooked
- Head small; neck thick, short
- Legs and feet short
- Males more brightly colored in some species



Gray-chinned Minivet, *Pericrocotus solaris*. Fraser's Hill, Pahang, Malaysia. © Con Foley.





**Habitat** Campephagids live in habitats varying from very dry acacia scrub and spinifex desert to wet tropical forests.

**Food** Campephagids feed primarily on insects and other arthropods, and many species often take well-defended prey such as bees, wasps, and hairy caterpillars. Quite a few species eat at least some fruit, especially figs, and seeds.

**Breeding** Although information on campephagid reproductive biology is scant, it appears that most species are socially monogamous with biparental care. Only one species, the Ground Cuckoo-shrike *Coracina maxima* of Australia, is a well-studied cooperative breeder, but observations of multiple birds helping with various parental duties are scattered throughout the family. Most campephagids nest solitarily, but at least the White-winged Triller *Lalage tricolor* nests colonially with up to 15 nests in the same clump of trees. Campephagid nests are generally small, cup-shaped, and inconspicuous, and many incorporate lichens, hair, and fine twigs in their structure, often with spiderwebs to anchor them to branches. Females lay 1 to 5 eggs, with 2 or 3 eggs most typical. Both male and female typically assist in nest building and caring for young, but in some species the female does all parental duties on her own. Incubation takes

Campephagids are widespread in forest and savanna habitats of Asia, Australia, and Africa. Though morphologically variable, all species possess a relatively long tail, usually graduated. Mostly methodical and rather slow-moving foragers, these birds also tend to favor the higher strata of vegetation, and they can thus be quite easy to miss. All campephagids have interesting courtship displays, and those of the minivets, the most distinctive phylogenetic clade in this family, include steep climbs followed by fluttering descents, sometimes with the male chasing the female and grabbing the end of her tail in his bill on the way down. Male suitors of other species sometimes bring a flower to include in their courtship displays.



Black-faced Cuckoo-shrike, *Coracina novaehollandiae*. Atherton Tablelands, Queensland, Australia. © Drew Fulton.

from 14 to 27 days, and the chicks leave the nest after 12 to 30 days post-hatch. Fledglings are fed at least occasionally by the parents for up to three months post-fledging.

**Conservation** Although populations of most campephagids appear healthy, 14 species (17%) are of conservation concern largely as a result of habitat loss and restricted or fragmented ranges (9 NT, 4 VU, 1 CR). The critically endangered Reunion Cuckoo-Shrike *Coracina newtoni* lives only in a small patch of forest on Reunion Island in the Indian Ocean. Its population may be as few as 25 breeding pairs, and introduced predators, logging, and hunting all pose threats to the species' survival. Other species, mainly in Southeast Asia, are declining due to large-scale habitat conversion through logging. Three of the four vulnerable species are island forms in Asia, and the fourth, the Western Wattled Cuckoo-shrike *Lobotos lobatus*, has a very scattered and disjunct range in forest fragments in western Africa.



Ground Cuckoo-shrike, *Coracina maxima*, Hunua, Western Australia. © Graeme Chapman

**Relationships** Campephagidae is part of the corvoid radiation of oscine passerines. Like many members of the corvoid radiation, the exact position of the cuckoo-shrikes within the group is not completely resolved (Jønsson *et al.* 2011). Although some studies have suggested an early divergence in the core corvoid radiation (Barker *et al.* 2004), many other studies have largely agreed on a close relationship to a large and mostly African and Asian radiation, sometimes referred to as the Malaconotoidea (Fuchs *et al.* 2006c, Fuchs *et al.* 2007b, Jønsson *et al.* 2008b, Norman *et al.* 2009, Fuchs *et al.* 2012, Aggerbeck *et al.* 2014). The most likely sister groups for Campephagidae appear to be a clade made up of Artamidae, Platysteiridae, Vangidae, and Malaconotidae (Jønsson *et al.* 2008b) or an even larger clade that includes these same families plus Machaerirhynchidae, Aegithinidae, Prionopidae, and Rhagologidae (Aggerbeck *et al.* 2014). Within Campephagidae, there appear to be two main clades, with *Pericrocotus* sister to the remaining cuckoo-shrikes (Fuchs *et al.* 2007b, Jønsson *et al.* 2008b).



Passeriformes, Corvoid Oscines

# RHAGOLOGIDAE
## Mottled Whistler

1 genus • 1 species

**Related Families** Aegithinidae (ioras), Artamidae (woodswallows), Machaerirhynchidae (boatbills)

**Similar Birds** Whistlers and shrike-thrushes (Pachycephalidae), solitaires (Turdidae)

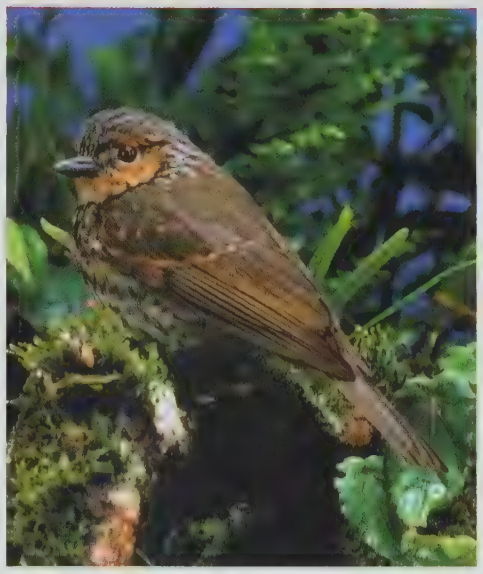
**Description**
- Plumage drab brown and gray, with mottling below and streaking above
- Wings medium, rounded; tail medium length
- Body medium-sized, ovoid
- Bill medium length, straight, deep, slightly inflated, with hook
- Head medium-sized; neck short
- Legs short; feet stout
- Female more colorful than male, with more streaking and rusty in face and edges of wing and tail

**Habitat** Mid-elevation montane forests, mostly 1500 to 2300 m, preferring primary, but occurring in secondary forest as well.

**Food** Very little information exists on the natural history of the Mottled Whistler, but it feeds mostly on berries and other fruit, occasionally taking insects as well.

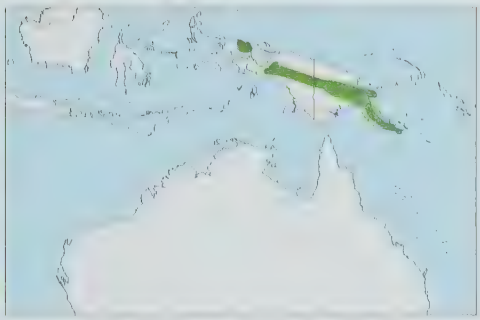
**Breeding** Nest is a cup woven of tendrils and rootlets in among small branchlets 2 to 4 m off the ground. Mosses and liverworts are placed on the outside of the nest for camouflage. Females lay 1 egg per clutch, and nothing is known of parental care or incubation and nestling periods in this species.

**Conservation** The Mottled Whistler faces no immediate conservation concerns.



Mottled Whistler, *Rhagologus leucostigma*. Huon Peninsula, Papua New Guinea. © William S. Peckover / VIREO.





**Relationships** Like many other odd corvoids of New Guinea, the Mottled Whistler was previously placed with the whistlers (Pachycephalidae), and at times was even placed in the genus *Pachycephala*. Recent studies, however, have found that Rhagologidae does not group with the whistlers (Dumbacher *et al.* 2008, Jønsson *et al.* 2008a), but instead is in a clade of mostly African and Asian birds in the corvoid radiation (Norman *et al.* 2009, Jønsson *et al.* 2011, Fuchs *et al.* 2012, Aggerbeck *et al.* 2014). Rhagologidae appears to be sister to Aegithinidae (Jønsson *et al.* 2011), to Artamidae (Aggerbeck *et al.* 2014), or to Machaerirhynchidae (Fuchs *et al.* 2012).

A little-known species from New Guinea, this shy and drab denizen of lower and mid-montane forests is often overlooked, being revealed by frequent mist-net captures rather than direct observations of birds in the field. Only recently has molecular systematics identified this bird as belonging to a distinct clade all its own, quite distantly related to the whistlers that share its common name. Its song has the cadence of a thrush or solitaire but the notes have the whipped, ringing quality that characterizes the vocalizations of so many corvoids. The newfound interest that comes with a monotypic family will no doubt lead to many more discoveries about the biology of this enigmatic bird in the near future.



Mottled Whistler, *Rhagologus leucostigma*. Arfak Mountains, West Papua, New Guinea. © Lars Petersson.

*RHAGOLOGUS*
1 species



*R. leucostigma*
Mottled Whistler

# ARTAMIDAE

## Woodswallows and Butcherbirds

6 genera · 23 species

Related Families Rhagologidae (Mottled Whistler), Machaerirhynchidae (boatbills)

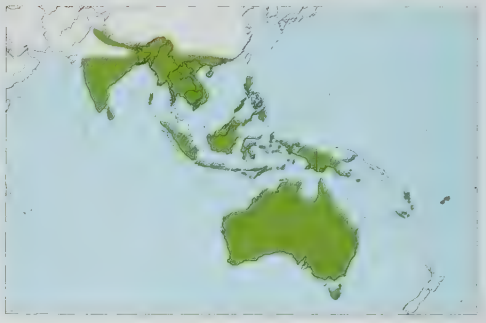
Similar Birds Monarch flycatchers (Monarchidae), vangas (Vangidae), crows (Corvidae), river martins (Hirundinidae), Bristlehead (Pityriasidae)

Description
- Plumage usually with bold patterns; most with black, brown, or gray dominant and contrasting accents in white or, in *Peltops* species, red
- Wings long, pointed in woodswallows, broad in other groups; tail short to medium-long
- Body medium to large, cylindrical ovoid
- Bill medium to long, fairly thick and hooked in most groups, thinner and without hook in *Artamus* species
- Head large; neck short and thick
- Legs short to medium-long; feet thick
- Sexes similar in most species; males more brightly colored in some



Pied Currawong, *Strepera graculina*. Brisbane, Australia. © John McKean.





These medium to large songbirds inhabit forests, gardens, and open areas from Australia to Southeast Asia. Most members of this group have a distinctive silvery-blue bill with a graded black tip and there are two functional groups: those that are sallying insectivores (woodswallows and *Peltops* species) and those with hooked bills (butcherbirds, currawongs, and Australian magpies) that are predators on large invertebrates and small vertebrates and are some of the most important Australian predators of birds' nests. At first glance, the gregarious and graceful woodswallows seem unlikely relatives of the large, aggressive magpies of eastern Australia that attack any humans, no matter what their intent, who come near their suburban nests.

Habitat Woodswallows live in open habitats, particularly savanna and woodlands, with scattered trees supplying perches from which to hunt. Other species live in a wider range of habitats, from open shrubland to dense rainforest.

Food Artamids feed on a diverse array of foods. *Artamus* and *Peltops* species are sit-and-wait predators of flying insects, perching on exposed snags before flying out to capture, then back to the perch to consume, their prey. The butcherbirds, currawongs, and magpies are far less specialized in their food preferences, consuming a wide variety of insects, fruit, seeds, and small vertebrates, including eggs and chicks from the nests of other birds. These birds often perch on exposed perches and pounce on prey once spotted on the ground. At least woodswallows and butcherbirds also take nectar occasionally.

Breeding Artamids are generally monogamous with biparental care. Many species in this family are cooperative breeders, retaining offspring of previous breeding attempts to help with nest defense and feeding young. Butcherbirds and magpies exhibit a complex "plural breeding" system where groups containing several breeding pairs build separate nests in a single group-defended territory and share chick-feeding



White-breasted Woodswallow, *Artamus leucorynchus*. Fowler's Gap, New South Wales, Australia. © Mark A. Chappell.

duties among nests. Artamids generally build simple cup nests, constructing them mainly of sticks and twigs and lining them with grass, vines, and other fine material. Nests are usually placed in the large fork of a trunk or branch. Females generally lay clutches of 2 to 5 eggs. In the woodswallows and currawongs, both sexes contribute to nest-building. In the magpies and butcherbirds, females usually build the nest alone. Only the female incubates, but both male and female, as well as any helpers present, feed the nestlings. Incubation takes 14 to 23 days, and the nestlings leave the nest after 18 to 30 days. After they fledge, young are fed for up to three months.

**Conservation** There are no immediate conservation concerns for any of the Artamidae.

**Relationships** Artamidae is part of the large and diverse corvoid radiation of oscine passerines. Within Corvoidea, Artamidae is part of a well-supported clade sometimes separated as its own superfamily, Malaconotoidea (Cracraft 2014). Within this clade, Artamidae may be sister to Rhagologidae (Aggerbeck *et al.* 2014) or Machaerirhynchidae (Jønsson *et al.* 2011), or sister to Rhagologidae and Machaerirhynchidae taken as a clade together (Fuchs *et al.* 2012); these three taken together are then in turn sister to the rest of this large, mainly African and Asian radiation (Beresford *et al.* 2005, Moyle *et al.* 2006b, Jønsson *et al.* 2011, Fuchs *et al.* 2012, Jønsson *et al.* 2012, Reddy *et al.* 2012, Aggerbeck *et al.* 2014). This family is made up of many taxa (woodswallows, butcherbirds, *Peltops*, and Australian Magpies) that were formerly treated as separate families, but molecular phylogenetic studies now show that these members of the Artamidae form a strongly supported group, with the two subfamilies outside of *Peltops* being sister clades (Barker *et al.* 2004, Christidis & Boles 2008, Norman *et al.* 2009, Aggerbeck *et al.* 2014). The precise relationships of *Peltops* species of New Guinea are still somewhat uncertain, but it is clear that they can be seen as part of Artamidae (Fuchs *et al.* 2012, Norman *et al.* 2009, Aggerbeck *et al.* 2014).



Australian Magpie, *Gymnorhina tibicen*. Wollongong, New South Wales, Australia. © Mark A. Chappell.



# MACHAERIRHYNCHIDAE
## Boatbills

1 genus • 2 species

**Related Families** Artamidae (woodswallows and butcherbirds), Rhagologidae (Mottled Whistler), Aegithinidae (ioras)

**Similar Birds** Tody-flycatchers (Tyrannidae), fantails (Rhipiduridae), monarch flycatchers (Monarchidae), whistlers (Pachycephalidae)

**Description**
- Plumage with bold yellow and black patches
- Wings short, rounded; tail long, graduated, often cocked over back
- Body small, ovoid, with horizontal posture
- Bill broad, medium long, dorsoventrally flattened
- Head medium sized; neck short, thick
- Legs short; feet small
- Males more brightly colored and boldly patterned than females

**Habitat** The boatbills live in both lowland and montane rainforest, as well as edge habitats and secondary forests.

**Food** The boatbills are primarily aerial insectivores, sallying after flying insect prey. However, they also glean insects and other invertebrates from leaf surfaces.

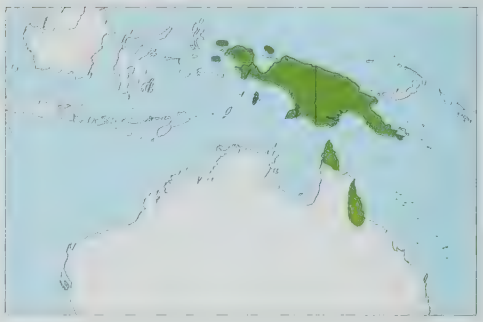
**Breeding** Little is known about the breeding biology of the boatbills; however, they appear to be monogamous with biparental care. They build a simple cup nest, which is either atop a branch or suspended from a horizontal forked branch. Nests are made of rootlets, tendrils, and other plant fibers that are bound together with spiderwebs and sometimes decorated with moss and lichen. Females lay 2 or 3 eggs per clutch. Both male and female build the nest, incubate the eggs, and feed the young. Incubation appears to take at least two weeks, but there is apparently nothing else known.

**Conservation** There are no immediate conservation concerns for the boatbills.



Black-breasted Boatbill, *Machaerirhynchus nigripectus*. Kumul Lodge, Papua New Guinea. © Erik Enbody.





Boatbills are small yellow inhabitants of the wet forests of northern Australia and New Guinea move through the jungle gathering insects from the air and leaves as they go. With their large heads, horizontal carriage, and a habit of cocking up their tail over their back most of the time, they bear a remarkable convergence in both morphology and behavior to the tody-flycatchers of the New World. But a convergence it clearly is, as the boatbills are more closely related to a clade of birds that are mostly much larger and less agile.

**Relationships** The boatbills are part of Corvoidea. Though they have long been placed with Monarchidae, recent phylogenetic evidence suggests that the boatbills form a distinct clade that is only distantly related to the monarch flycatchers. They belong in a well-supported clade of mainly African and Asian species (Barker *et al.* 2004, Beresford *et al.* 2005, Fuchs *et al.* 2004, Fuchs *et al.* 2006c, Moyle *et al.* 2006b, Johansson *et al.* 2008a, Norman *et al.* 2009, Jønsson *et al.* 2011, 2012, Reddy *et al.* 2012, Aggerbeck *et al.* 2014), sometimes collectively referred to as the superfamily Malaconotoidea (Cracraft 2014). The exact position of Machaerirhynchidae within this radiation is not clear, with different studies finding it sister to Artamidae (Norman *et al.* 2009, Jønsson *et al.* 2011), Rhagologidae (Fuchs *et al.* 2012), or Aegithinidae (Jønsson *et al.* 2012).



Yellow-breasted Boatbill, *Machaerirhynchus flaviventer*. Iron Ranges NP, Queensland, Australia. © Drew Fulton.

*MACHAERIRHYNCHUS*
2 species



*M. flaviventer*
Yellow-breasted Boatbill

Passeriformes, Corvoid Oscines

# VANGIDAE
## Vangas and Allies

21 genera • 37 species

**Related Families** Malaconotidae (bush-shrikes), Platysteiridae (batises and wattle-eyes)

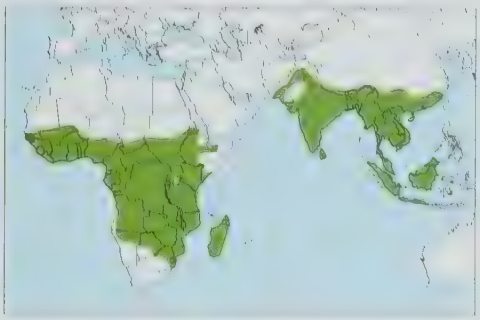
**Similar Birds** Monarch flycatchers (Monarchidae), nuthatches (Sittidae), birds-of-paradise (Paradisaeidae), woodcreepers (Furnariidae), shrikes (Laniidae), butcherbirds (Artamidae)

**Description**
- Plumage most commonly white below with gray, black, blue, or rufous above, but some species all dark
- Wings medium-long in most; tail generally medium length
- Body small to medium, ovoid
- Bill highly variable between species, from stout, straight, and short with a prominent hook to very long, thin, and decurved
- Head large; neck most often short, thick
- Legs and feet short, stout
- Males more boldly colored in some species



Blue Vanga, *Cyanolanius madagascarinus*. Ankarafantsika NP, Madagascar. © Ken Behrens.



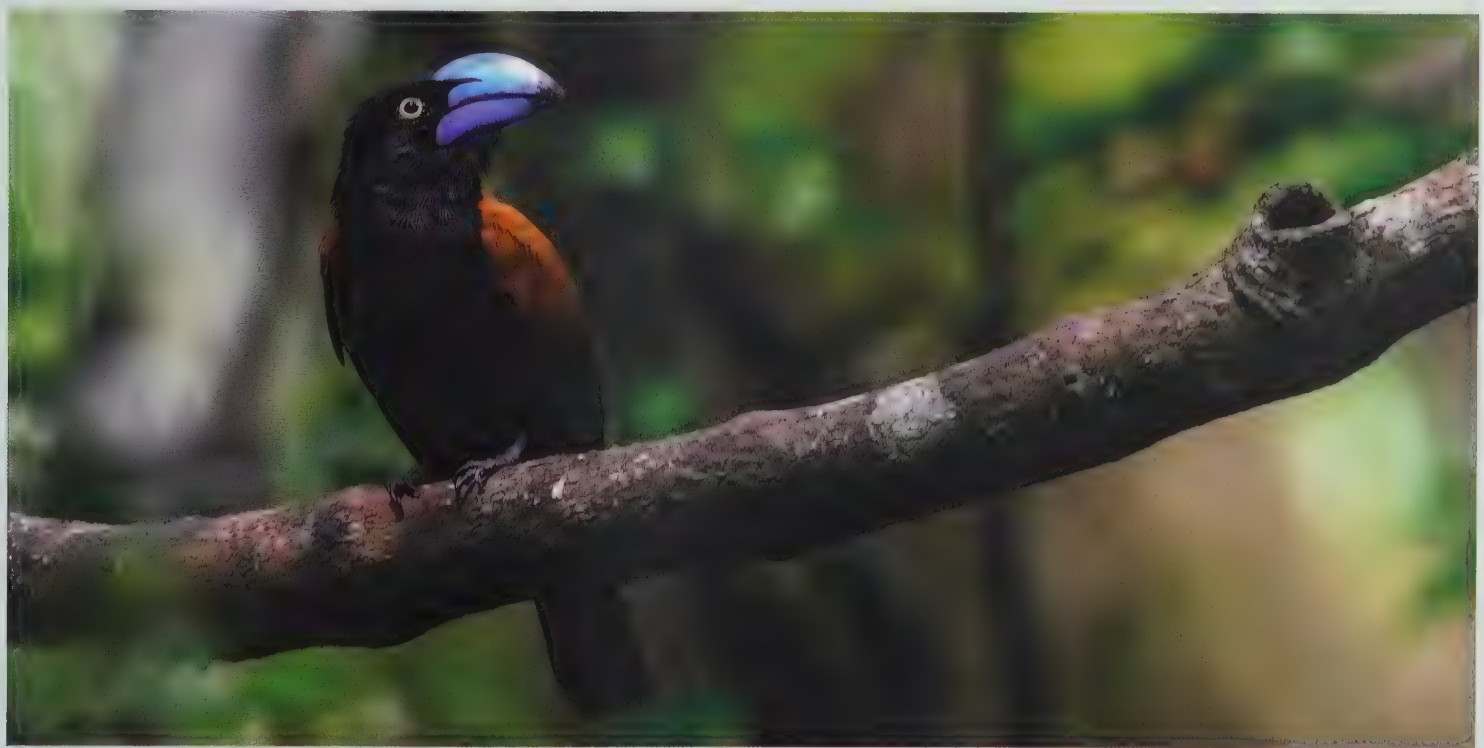


**Habitat** Vangids live in all forested habitats of Madagascar and from scrub and open woodlands to rainforest in Africa and Asia.

**Food** The vangids are primarily insectivorous, although some species may also take small vertebrates like frogs and lizards. The wide range of bill shapes found in this family allows closely related species to exploit different ecological niches. The large-billed Helmet Vanga *Euryceros prevostii*, for example, takes and dismembers prey as large as small vertebrates by using a sit-and-wait, then pounce, strategy; the small-billed Tylas Vanga *Tylas eduardi* feeds on smaller prey such as caterpillars and spiders by gleaning and hovering, catching many prey on the wing; Nuthatch Vanga *Hypositta corallirostris* jumps and climbs up trunks in search of prey in bark fissures; and Sickle-billed Vanga *Falculea palliata* probes into crevices and holes, often using its upper bill alone, after a variety of invertebrate prey. Helmet-shrikes, wood-shrikes, and Philentomas generally take invertebrate prey, with fruit as a minor component of the diet, especially in forest-dwelling species. Many vangas, helmet-shrikes, and wood-shrikes are active participants in mixed-species foraging flocks.

**Breeding** Most vangas are monogamous and breed as single pairs. However, at least two species, the Rufous Vanga *Schetba rufa* and Chabert Vanga *Leptopterus chabert*, are cooperative breeders, and it appears that the Sickle-billed

Following a storyline repeated on many isolated island environments, a passerine immigrant to Madagascar millions of years ago gave rise to descendants with a bewildering array of bill types perfectly suited to the types of vegetation that evolved around them. From sharp pincers to long, decurved forceps, the bills of vangids have captured in this biogeographic microcosm a level of feeding tool diversity displayed by whole communities of songbirds on the mainland. These Malagasy endemics are allied with a diverse group of lightly proportioned, vaguely shrike-like passerines in Africa and Asia, all of which are more closely related to the core vangids than they are to any other passerine group.



Helmet Vanga, *Euryceros prevostii*. Masoala NP, Madagascar. © Ken Behrens.

Vanga and Bernier's Vanga *Oriolia bernieri* are cooperatively polyandrous, with a female mating with several males, all of which take part in parental care. Most vangids build a nest that is at least vaguely cupshaped and placed atop a branch or branches, or suspended from the tip of a branch. Many species use spiderwebs in nest construction. *Leptopterus* makes a bulky stick nest and *Hypositta* a cup of tree fern fibers. Females typically lay 2 to 5 eggs. In all species studied, males and females appear to contribute equally to parental care, with both sexes constructing the nest, incubating the eggs, brooding chicks, and provisioning the young. In the helmetshrikes (apparently all cooperative breeders), helpers of both sexes contribute greatly to all aspects of parental care. Vangid incubation takes 16 to 21 days, and nestlings leave the nest after 17 to 24 days in the nest. They are often fed by their parents, or other group members if present, for 10 to 12 weeks after fledging.

**Conservation.** Habitats in Madagascar are under tremendous pressure from an expanding human population; dry forests and scrublands are being burned for agriculture or threatened by grazing, and wet forests are being harvested for timber and cleared for agriculture. The five species of immediate conservation concern in Madagascar (33% of species there) are all range limited species with small population sizes (1 NT, 3 VU, 1 EN). Helmetshrikes on the mainland of Africa are not doing much better, with three species (38%) of conservation concern (1 NT, 1 VU, 1 EN), all limitedrange and suffering from the conversion of habitat for agriculture. The eight species of shrike flycatchers, flycatcher shrikes, and philentomas include one near threatened species of philentoma that is at risk from its small range and the widespread clearance of forest in the Malay Archipelago.

**Relationships.** Vangidae is part of Corvoidea. Within the superfamily, they are in a well supported clade of mainly African and Asian species (Barker *et al.* 2004, Beresford *et al.* 2005, Fuchs *et al.* 2004, Fuchs *et al.* 2006a, Moyle *et al.* 2006b, Johansson *et al.* 2008a, Norman *et al.* 2009, Jønsson *et al.* 2011, Jønsson *et al.* 2012, Reddy *et al.* 2012, Aggerbeck *et al.* 2014), sometimes collectively referred to as the superfamily Malaconotoidea (Cracraft 2014). Owing to their great morphological variation, many of the Malagasy vangas were previously thought to be allied to other families, including Sittidae, Pycnonotidae, Laniidae, Paridae, and Timaliidae, before phylogenetic studies identified them as members of Vangidae (Yamagishi *et al.* 2001, Manegold 2008a, Fuchs *et al.* 2012, Jønsson *et al.* 2012, Reddy *et al.* 2012). Within the corvoid radiation, Vangidae may be sister to Platysteiridae (Fuchs *et al.* 2004, Fuchs *et al.* 2012, Jønsson *et al.* 2012, Reddy *et al.* 2012), to Malaconotidae (Jønsson *et al.* 2011), or to a clade made up of these two families together (Johansson *et al.* 2008a). The boundaries of Vangidae are controversial; traditionally it included only lineages endemic to Madagascar, but recent phylogenies (Barker *et al.* 2004, Jønsson *et al.* 2011, Fuchs *et al.* 2012, Jønsson *et al.* 2012, Reddy *et al.* 2012) show that the radiation from Madagascar is embedded within a group that also includes the helmetshrikes (traditional Prionopidae) of Africa and a clade of African and Southeast Asian species—the woodshrikes (*Tephrodornis*) and the shrike flycatchers and flycatchershrikes (*Hemipus, Bias, Megabyas*). Within this group, relationships are still not well resolved, with the vangas sometimes found as sister to the Asian genera, which are in turn sister to the helmetshrikes (Jønsson *et al.* 2011), or with the vangas sister to *Philentoma*, which are in turn closely related to the other groups (Fuchs *et al.* 2012, Jønsson *et al.* 2012). Given the uncertainty of relationships within this clade, it is necessary either to group them all together into an expanded Vangidae (as done here), or to recognize many new families for the non-Malagasy lineages. Regardless of this family-level classification, the Malagasy vanga radiation is monophyletic and represents a spectacular case of adaptive radiation.



Sickle-billed Vanga, *Falculea palliata*. Ankaratantsika NP, Madagascar. © Ken Behrens

## Subfamily VANGINAE (1 OF 2)

*NEWTONIA*
4 species



*N. brunneicauda*
Common Newtonia

*TYLAS*
1 species



*T. eduardi*
Tylas Vanga

*CALICALICUS*
2 species



*C. madagascariensis*
Red-tailed Vanga

*HYPOSITTA*
1 species



*H. corallirostris*
Nuthatch Vanga

*LEPTOPTERUS*
1 species

*L. chabert*
Chabert Vanga

*CYANOLANIUS*
1 species

*C. madagascarinus*
Blue Vanga

*MYSTACORNIS*
1 species

*M. crossleyi*
Madagascar Groundhunter

*PSEUDOBIAS*
1 species

*P. wardi*
Ward's Shrike-flycatcher

*VANGA*
1 species

*V. curvirostris*
Hook-billed Vanga

*SCHETBA*
1 species

*S. rufa*
Rufous Vanga

*EURYCEROS*
1 species

*E. prevostii*
Helmet Vanga

*XENOPIROSTRIS*
3 species

*X. damii*
Van Dam's Vanga

*ORIOLIA*
1 species

*O. bernieri*
Bernier's Vanga



*ARTAMELLA*
1 species

*A. viridis*
White-headed Vanga

*FALCULEA*
1 species

*F. palliata*
Sickle-billed Vanga

*PRIONOPS*
8 species

*P. plumatus*
White-crested Helmet-shrike

*HEMIPUS*
2 species

*H. picatus*
Bar-winged
Flycatcher-shrike

*TEPHRODORNIS*
2 species

*T. pondicerianus*
Common Wood-shrike

*MEGABYAS*
1 species

*M. flammulatus*
African Shrike-flycatcher

*BIAS*
1 species

*B. musicus*
Black-and-white Shrike-flycatcher

*PHILENTOMA*
2 species

*P. velata*
Maroon-breasted
Philentoma

# PLATYSTEIRIDAE

## Batises and Wattle-eyes

4 genera • 28 species

**Related Families** Vangidae (vangas and allies), Malaconotidae (bush-shrikes), Pityriasidae (Bristlehead), Aegithinidae (ioras)

**Similar Birds** Some flycatchers and mudlarks (Muscicapidae and Monarchidae), gnateaters (Conopophagidae)

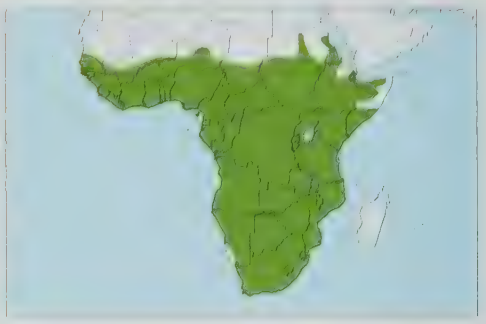
**Description**

- Plumage generally boldly patterned black and white
- Wings medium-short; tail short (*Batis* and *Dyaphorophyia* species) to medium long (*Platysteira* species)
- Body small, ovoid
- Bill short to medium, straight, thin, mildly hooked
- Head large, especially in batises; wattle-eyes with colorful, fleshy eye-rings
- Legs short; feet small
- Females with more chestnut or yellow in their plumage



Chinspot Batis, *Batis molitor*
Kruger NP, South Africa © Dubi Shapiro





**Habitat** Platysteirids live in a variety of habitats, from wooded patches in deserts to open savanna woodlands, mangroves, and wet montane forests.

**Food** Platysteirids eat a diverse assortment of insect and other small arthropod prey (including grasshoppers, spiders, centipedes, moths, cicadas, and beetles), with occasional small vertebrates. They hunt primarily by gleaning and sallying for insects, and *Lanioturdus* runs after and seizes prey on the ground.

**Breeding** Batises and wattle-eyes all appear to be monogamous, often with one helper, presumed to be an offspring from the previous year's nesting attempt, helping the mated pair in raising young. The nests of all platysteirids are very similar, consisting of a small woven cup nest built of fine plant materials, including stems and rootlets, and decorated with moss and lichens. The nest is typically bound with spiderweb and placed on a horizontal branch. Females typically lay 1 to 3 eggs. Both male and female platysteirids construct the nest. Both sexes incubate, though in many species the female takes the majority share of the duty, sometimes being fed by the male on the nest. Incubation takes 17 to 18 days, and both sexes provision the young, which remain in the nest for about 16 days. Fledged young continue to be fed by parents post-fledging for up to several months.

These small to mid sized songbirds of forests and woodlands in sub-Saharan Africa are restless insectivores. Even while sitting and waiting for prey to fly by or appear on a nearby branch, they fidget as though anxious to take off on another flight. Batises are the larger-headed of the two main groups in this family, and the wattle-eyes all bear brightly colored wattles above or around their eyes. The White-tailed "Shrike" *Lanioturdus torquatus* is much like a large, stocky batis, running on the ground with long legs though dry woodlands and scrub in southwestern Africa. Many platysteirids make an array of strange sounds when alarmed or in display, including grunting, croaking, bill snapping, and clicking noises made with their wings.



White-tailed Shrike, *Lanioturdus torquatus* Erongo Mountains, Namibia © Ken Behrens

**Conservation** Of the three platysteirid species (11%) that are of conservation concern (2 NT, 1 EN), all are restricted-range species. The endangered Banded Wattle-eye *Platysteira laticincta* is restricted to forest fragments in the highlands of Cameroon, and the one thing that may save it is that a large local human population is dependent on the same forests for resources and livelihoods, one of which is income from eco-tourism.

**Relationships** The batises and wattle-eyes are part of the corvoid radiation of oscine passerines. Within this superfamily, they are part of a well-supported clade of mainly African and Asian species (Barker *et al.* 2004, Beresford *et al.* 2005, Fuchs *et al.* 2004, Fuchs *et al.* 2006c, Moyle *et al.* 2006b, Johansson *et al.* 2008a, Norman *et al.* 2009, Jønsson *et al.* 2011, Jønsson *et al.* 2012, Reddy *et al.* 2012), which is sometimes treated as its own superfamily, Malaconotoidea (Cracraft 2014). Within this radiation, Platysteiridae appears to be sister to Vangidae (Fuchs *et al.* 2004, Johansson *et al.* 2008a, Fuchs *et al.* 2012, Jønsson *et al.* 2011, 2012, Reddy *et al.* 2012, Aggerbeck *et al.* 2014), or to a clade that includes Pityriasidae, Aegithinidae, and Malaconotidae (Moyle *et al.* 2006b). *Lanioturdus*, a bird that was traditionally placed in Malaconotidae, instead appears to be sister to the other members of the Platysteiridae (Fuchs *et al.* 2004, Beresford *et al.* 2005, Njabo *et al.* 2008, Johansson *et al.* 2008a, Fuchs *et al.* 2012, Jønsson *et al.* 2011, Reddy *et al.* 2012, Jønsson *et al.* 2012).



Black-throated Wattle-eye, *Platysteira peltata*. St. Kitts Estate, AMatikulu, KwaZulu-Natal, South Africa. © Guy Upfold.

*LANIOTURDUS*
1 species



*L. torquatus*
White-tailed Shrike

*BATIS*
19 species



*B. capensis*
Cape Batis

*DYAPHOROPHYIA*
4 species



*D. blissetti*
Blissett's Wattle-eye

*PLATYSTEIRA*
4 species



*P. cyanea*
Brown-throated Wattle-eye

# AEGITHINIDAE
## Ioras

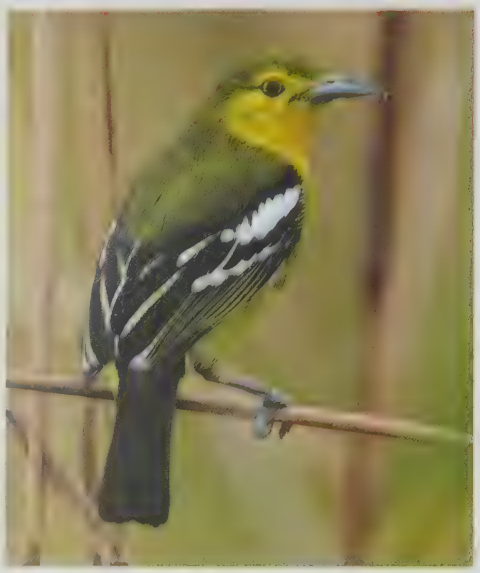
1 genus • 4 species

**Related Families** Malaconotidae (bush-shrikes), Pityriasidae (Bristlehead), Rhagologidae (Mottled Whistler)

**Similar Birds** Vireos (Vireonidae), small orioles (Icteridae), New World warblers (Parulidae)

**Description**
- Plumage predominantly yellow, with black and white markings common on wings
- Wings short, rounded; tail medium-long
- Body small, cylindrical ovoid
- Bill medium-long, stout, pointed, slightly inflated
- Head medium-sized; neck short, thick
- Legs medium length, feet small
- Males more boldly patterned than females, and with shorter tails as adults

**Habitat** Ioras occupy a wide variety of wooded and shrubland habitat, including dense, closed-canopy forests, orchards, arid acacia shrubland, mangroves, and semi-evergreen or evergreen rainforest.



Common Iora, *Aegithina tiphia*
Changi, Singapore © Con Foley





The ioras are common insectivorous birds of Asian forests and gardens. Yellow or green, with bold black and white markings in males, they hop, bound, and flit through the canopy, often foraging out on branch tips and hanging upside-down. In general appearance they recall diminutive New World orioles. Male ioras have stunning courtship displays, in at least some species involving steep climbs followed by parachute flights with all the long yellow feathers on back and front puffed out, and underlain by very long white flank feathers, to give the bird the look of a descending yellow ball. Some have suggested that the demands of these flights have led to selection for the relatively short tails of adult males.

**Food** Ioras are insectivorous, although analysis of stomach contents suggests that some species occasionally consume seeds and buds as well.

**Breeding** Much of what is known about the breeding biology of the ioras comes from information on *A. tiphia*. Ioras appear to be monogamous with biparental care. Iora nests are small, neat cups constructed primarily of grass, rootlets, and other fine plant materials bound together with spiderwebs. Clutch size in ioras ranges from 2 to 4 eggs, depending on location. Female ioras construct the nest; however, both male and female share all other aspects of nesting, from incubation to provisioning the young. Incubation takes about 14 days, but the durations of nestling and post-fledging periods are apparently not known. Recently fledged young being fed by parents weeks after hatching suggest that post-fledging parental care is extended.

**Conservation** Logging of the primary forest of the Malay Peninsula and Archipelago in the late 20th century is responsible for the large-scale population decline of one iora species (25%). The Green Iora *A. viridissima* is now limited to fragments of its former habitat (1 NT).

**Relationships** Aegithinidae is a small family of Southeast Asian birds that is part of the corvoid radiation of oscine passerines, belonging in a clade that is sometimes treated as its own superfamily, Malaconotoidea (Cracraft 2014). Traditionally the ioras were often placed within or near Chloropseidae, but molecular phylogenetic studies have shown that the ioras are very distantly related, part of a clade of largely African and Asian species instead (Beresford *et al.* 2005, Moyle *et al.* 2006b, Fuchs *et al.* 2012, Jønsson *et al.* 2011, 2012, Reddy *et al.* 2012, Aggerbeck 2014). Within this radiation, the position of Aegithinidae is not well resolved, but it has alternately been found to be sister to Rhagologidae (Jønsson *et al.* 2011), Pityriasidae (Moyle *et al.* 2006b), or Malaconotidae (Reddy *et al.* 2012), or to a clade containing both Malaconotidae and Pityriasidae (Fuchs *et al.* 2012, Aggerbeck *et al.* 2014).



Green Iora, *Aegithina viridissima* Danum Valley, Sabah, Borneo © D. W. Winkler

*AEGITHINA*
4 species



*A. tiphia*
Common Iora

Passeriformes, Corvoid Oscines

# PITYRIASIDAE
## Bristlehead

1 genus • 1 species

**Related Families** Aegithinidae (ioras), Malaconotidae (bush-shrikes)

**Similar Birds** Butcherbirds (Artamidae)

**Description**
- Plumage predominantly black; thighs and head red with bare yellow crown covered in thick hair-like projections of skin
- Wings long, deep, rounded; tail medium-short
- Body medium-large, ovoid, stocky
- Bill medium-long, deep, straight, with distinct hook at tip
- Head large; neck short, thick
- Legs and feet short and thick
- Sexes generally similar; females typically with more red feathers in the breast

**Habitat** Bristleheads occupy a wide range of forested habitats in Borneo, including undisturbed primary forest, mangroves, montane heath forest, and *Acacia* plantations.

**Food** Bristleheads feed most frequently on large invertebrates, such as katydids, cicadas, and stick insects, and less commonly on small vertebrates, such as lizards and frogs, as well as small amounts of fruit.

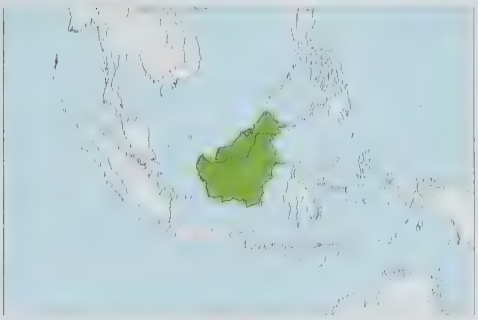
**Breeding** Only anecdotal information on Bristlehead breeding biology exists, some of which suggests the presence of cooperative breeding in this species. Apparently, no nest has been described with a published description, though photos on the internet look like birds carrying nest material. Nothing is known of the patterns of parental care.

**Conservation** While the Bristlehead does not face any immediate conservation concerns, habitat destruction and degradation continue on the island of Borneo, and presumed declines in this species have led to it being listed as near threatened (100%; I-NT).



Bristlehead, *Pityriasis gymnocephala*. Danum Valley, Sabah, Borneo. © D. W. Winkler.





**Relationships** The Bristlehead is part of the corvoid radiation of oscine passerines, where it is part of a clade that is sometimes treated as its own superfamily, Malaconotoidea (Cracraft 2014). Its earlier taxonomic history is convoluted; it has variously been placed in at least seven different avian families, including Laniidae, Artamidae, Sturnidae, Timaliidae, and Vangidae. Although the position of the Bristlehead is not completely resolved, recent studies have indicated it is sister to Malaconotidae or Aegithinidae (Moyle *et al.* 2006b, Fuchs *et al.* 2012, Aggerbeck *et al.* 2014).

This is the sole bird family endemic to Borneo, home of one of the most diverse avifaunas in Asia. The Bristlehead has much exotic appeal. Though its body form and beak are rather like those of a large-headed butcherbird, its head and body are painted with brilliant red, topped off with a naked yellow crown covered with the prickly bristles that give it its name. It is something of a cipher, traveling through and above the forest canopy in groups of a dozen or so, and seldom maintaining a regular schedule that can be anticipated or understood. These travelers keep in touch with amphibian-like nasal and guttural calls somewhat reminiscent of those given by the more social jays.



Bristlehead, *Pityriasis gymnocephala*. Sepilok, Sabah, Borneo. © James Eaton / Birdtour Asia.

*PITYRIASIS*
1 species



*P. gymnocephala*
Bristlehead

# MALACONOTIDAE
## Bush-shrikes

9 genera • 48 species

**Related Families** Platysteiridae (batises and wattle-eyes), Vangidae (vangas and allies), Aegithinidae (ioras), Pityriasidae (Bristlehead)

**Similar Birds** Vangas (Vangidae), shrikes (Laniidae), nicators (Nicatoridae)

**Description**
- Plumage black and white or gray and white with patches of rufous or olive above, and, in some species, brightly colored with bold or blended patches of green, yellow, red, or orange beneath
- Wings short, rounded; tail medium to long, rounded
- Body small to medium; cylindrical ovoid
- Bill typically medium length and heavy, with strong hook
- Head large; neck thick
- Legs medium-long; feet short to medium, stout
- In a few species, males more brightly colored or more boldly patterned than females

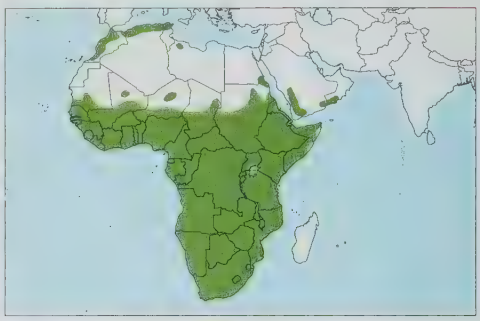
**Habitat** Malaconotids occupy a wide variety of habitats in Africa, from open savanna woodland and acacia scrubland to dense rainforest, as long as it provides some dense vegetation for cover.

**Food** Bush-shrikes, like the laniid shrikes for which they are named, are accomplished predators of small animals. Most, especially the tchagras, hunt insects from stationary perches, sometimes flying out to catch them on the ground or in the air. Others forage in the undergrowth or glean insects from dense vegetation. Some of the larger malaconotids will also hunt lizards, frogs, and small mammals.



Black-headed Gonolek, *Laniarius erythrogaster*. Queen Elizabeth NP, Uganda. © Piotr Jonczyk.





Malaconotids are shrike-like birds endemic to sub-Saharan Africa. Some are plain black and white, resembling somewhat the eponymous laniid true shrikes, and like them, malaconotids are able predators of large insects and small vertebrates. Although some species hunt, shrike-like, from exposed perches in open country, many tend to skulk in the underbrush or thick canopy; though secretive and hard to see, they are also among the most colorful and stunning birds in Africa, many having bright yellow and red plumages with accented hoods or masks in black or gray. Malaconotids are also known for their songs, with several species engaging in antiphonal singing.

**Breeding** Relatively little is known about the breeding biology of birds in this family, but they appear to be monogamous with biparental care. There is currently no evidence of cooperative breeding in this group. Individuals appear to form long-term pair bond, and have large breeding territories. Duetting, which is common to many species, may help to maintain long-term pair bonds. The nests of most malaconotids are flimsy cup-shaped or saucer-shaped structures made mostly of twigs. Some species, such as the puffbacks (*Dryoscopus*) and the Brubru *Nilaus afer*, build more compact nests that are built of twigs, grasses, and other plant material and bound together with spiderwebs. Many nests are decorated with lichens. In all but the puffbacks, males help the female build the nest. Females generally lay 1 to 5 eggs, most frequently 2 or 3. Except in puff-backs and a few other scattered species, males and females seem to play roughly equal roles in incubation. Both male and female feed the chicks, but information on incubation and nesting periods of any species appears to be lacking.



Gray-headed Bush-shrike, *Malaconotus blanchoti*. Bela Bela, Limpopo, South Africa. © Albie Venter.

**Conservation** Just over 17% of malaconotids face some conservation threats (1 VU, 2 NT, 3 EN, and 1 CR). All of the most highly endangered and threatened species, such as the critically endangered Uluguru Bush-shrike *Malaconotus alius* and the endangered Mount Kupe Bush-shrike *Chlorophoneus kupeensis*, have very small, restricted ranges and are declining as a result of human population pressure on ever more-fragmented habitat. As for other taxa in Africa threatened by similar plights, one of the only hopes remaining for these species is that returns from eco-tourism might encourage the preservation of the few patches of remaining habitat.

**Relationships** The bush-shrikes are part of the corvoid radiation of oscine passerines, in a clade that includes many African and Asian

species (Barker *et al.* 2004, Beresford *et al.* 2005, Fuchs *et al.* 2004, Fuchs *et al.* 2006c, Moyle *et al.* 2006b, Johansson *et al.* 2008a, Norman *et al.* 2009, Fuchs *et al.* 2012, Jønsson *et al.* 2011. 2012, Reddy *et al.* 2012, Aggerbeck *et al.* 2014). Although previously they have been placed with a number of other families including Laniidae and Corvidae, recent studies have found that malaconitds are distinct, part of a group sometimes treated as its own superfamily, Malaconotoidea (Cracraft 2014). Within this group, Malaconotidae has recently been found to be sister to a variety of groups: Platysteiridae (Fuchs *et al.* 2006c, Johansson *et al.* 2008a), a clade that contains Vangidae plus Platysteiridae (Fuchs *et al.* 2004, Jønsson *et al.* 2011, 2012), Pityriasidae (Fuchs *et al.* 2012, Aggerbeck *et al.* 2014), Aegithinidae (Reddy *et al.* 2012), or a clade that includes both Pityriasidae and Aegithinidae (Moyle *et al.* 2006b).



Brubru, *Nilaus afer*. Yabelo, Oromia, Ethiopia. © Piotr Jonczyk.



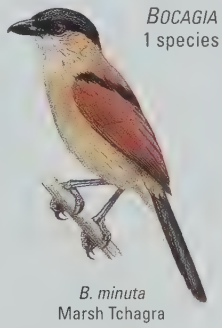
*MALACONOTUS*
6 species

*M. cruentus*
Fiery-breasted Bush-shrike



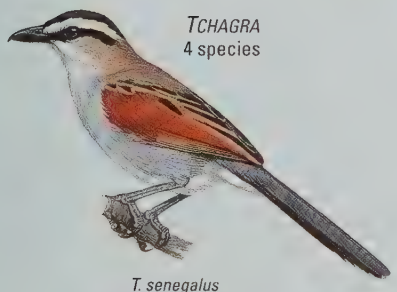
*DRYOSCOPUS*
6 species

*D. cubla*
Black-backed Puffback



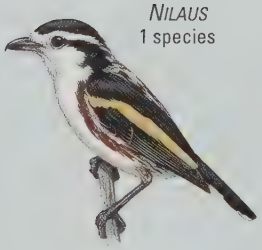
*BOCAGIA*
1 species

*B. minuta*
Marsh Tchagra



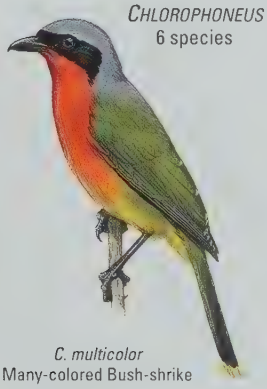
*TCHAGRA*
4 species

*T. senegalus*
Black-crowned Tchagra



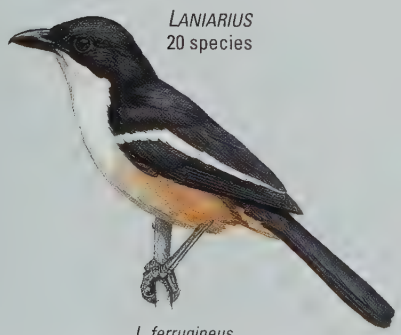
*NILAUS*
1 species

*N. afer*
Brubru



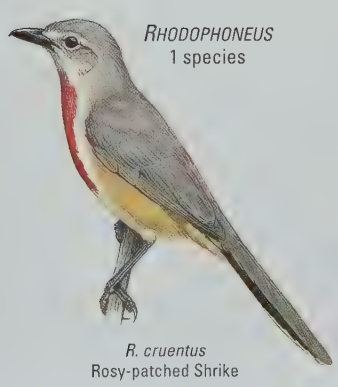
*CHLOROPHONEUS*
6 species

*C. multicolor*
Many-colored Bush-shrike



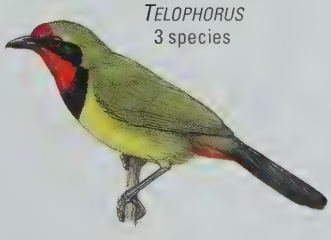
*LANIARIUS*
20 species

*L. ferrugineus*
Southern Boubou



*RHODOPHONEUS*
1 species

*R. cruentus*
Rosy-patched Shrike



*TELOPHORUS*
3 species

*T. dohertyi*
Doherty's Bush-shrike

# RHIPIDURIDAE
## Fantails

3 genera • 45 species

**Related Families** Dicruridae (drongos), Monarchidae (monarch flycatchers) or these and the other nine "crown corvoid" families

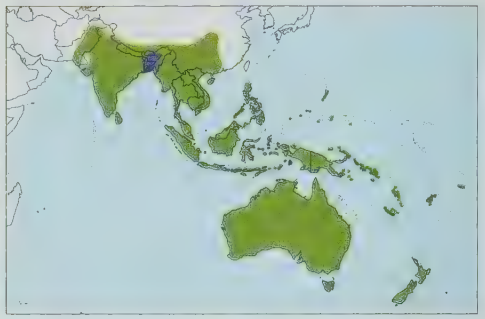
**Similar Birds** Chats (Muscicapidae), fairy flycatchers (Stenostiridae), *Myioborus* whitestarts (Parulidae)

**Description**
- Plumage generally muted grays, browns (often reddish), black-and-white, and rarely blue or yellow, often with a strong pattern around breast and face
- Wings medium-long; tail long, graduated and rounded, often held cocked above the horizontal and fanned side-to-side in an upward arc, with white markings on outer feathers or tips
- Body small, ovoid, with hunched and usually horizontal posture
- Head small; neck short, thick
- Bill short, broad, often with rictal bristles
- Legs short to medium; feet small
- Sexes similar



White-spotted Fantail, *Rhipidura albogularis*.
Kotagiri, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.





These earth-colored songbirds, with an eye-stripe or throat-patch in most, are named for their habit of fanning their tails as they move actively along branches in Australasian and South Asian forests. This rapid opening and closing of the tail feathers reveals and hides white tail-spots that are thought to startle insects into moving, revealing themselves and being captured by these quiet and generally inconspicuous birds. Most species are excellent aerial hunters as well. The family exhibits catholic tastes in habitat preferences, from mangrove forests and tropical rainforests to deserts and suburban environments.

**Habitat** Most fantails live in forested habitats, including mangrove forests, although one species, the Willie Wagtail *Rhipidura leucophrys*, prefers more-open areas, including suburban environments.

**Food** Rhipidurids are almost exclusively insectivorous. Birds capture prey by sallying after flying insects, gleaning insects from plants, or foraging on the ground. It is thought that fantails fan their tail and flick it back and forth in order to flush insects, as has been suggested for other birds, like the *Myioborus* warblers in the New World. *Lamprolia*, whose short tail and rump are a shining white, forages actively in branches and on the ground, but with no fanning of the tail, and *Chaetorhynchus* sits and waits and follows other species in mixed foraging flocks, grabbing prey scared up by others. The Willie Wagtail is unusual in sometimes taking small fish or lizards.

**Breeding** The breeding biology of the *Rhipidura* species appears to vary little and that of *Lamprolia* and *Chaetorhynchus* is poorly known. Fantails are monogamous with biparental care; the few well-studied species have relatively high rates of extra-pair paternity. The nests of fantails are all



Pied Fantail, *Rhipidura javanica*. Japanese Gardens, Singapore. © Con Foley.

quite similar, being small, neat cup nests built of grass and stems, with spiderwebs used in initial stages of construction and often adorning much of the exterior of the nest. Some species construct a nest with a "tail" consisting of grass and stems hanging below the nest. Nests are typically placed on a small branch or in the fork of a branch. The nest of *Lamprolia* appears a bit stouter, and that of *Chaetorhynchus* is a shallow basket. *Lamprolia* females lay a single-egg clutch and *Rhipidura* species lay 2 to 4 eggs. Both male and female fantails participate in nest construction, incubation, and feeding chicks. Incubation takes 12 to 14 days, and the chicks fledge after 13 to 17 days in the nest. The fledglings are decreasingly reliant on parental feeding until they finally become independent by about five weeks post-fledging.

**Conservation** As many species have small ranges, habitat destruction is the primary threat to the rhipidurids, of which six species (14%) are of conservation concern (4 NT, 2 VU). Both the Malaita Fantail *R. malaitae* and the Manus Fantail *R. semirubra* are considered vulnerable due to their very small insular ranges, and could experience rapid population declines if anything threatened their small populations.

**Relationships** Rhipiduridae is part of the corvoid radiation of oscine passerines, in or sister to a well-supported clade informally called the "crown corvoids" (Barker *et al.* 2004, Fuchs *et al.* 2006c, Driskell *et al.* 2007, Reddy & Cracraft 2007, Irestedt *et al.* 2008, Irestedt & Ohlson 2008, Jønsson *et al.* 2008b, Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014). Within this group, relationships are not well resolved, though Rhipiduridae may be sister to Monarchidae (Irestedt *et al.* 2008), to a clade that includes Paradisaeidae, Monarchidae, and Ifritidae (Norman *et al.* 2009), to the entire clade excluding Dicruridae (Barker *et al.* 2004, Reddy & Cracraft 2007), or to the entire clade in this radiation (Jønsson *et al.* 2011, Aggerbeck *et al.* 2014). Two odd birds have recently been discovered to be a part of Rhipiduridae, the Pygmy Drongo *Chaetorhynchus papuensis* (Reddy & Cracraft 2007, Irestedt *et al.* 2008, Norman *et al.* 2009, Nyári *et al.* 2009a, Jønsson *et al.* 2011) and the Silktail *Lamprolia victoriae* (Irestedt *et al.* 2008, Jønsson *et al.* 2011).



Willie-wagtail, *Rhipidura leucophrys*. Tara, Queensland, Australia. © B. G. Thomson.



Willie-wagtail, *Rhipidura leucophrys*. Stirling Range, Western Australia. © D. W. Winkler.



# DICRURIDAE
## Drongos

1 genus • 25 species

**Related Families** Platylophidae (Shrike-jay), Ifritidae (Ifrita), Monarchidae (monarch flycatchers), Laniidae (shrikes), Corvidae (crows and jays), Melampittidae (melampittas), Paradisaeidae (birds-of-paradise), Corcoracidae (Australian mudnesters), Rhipiduridae (fantails)

**Similar Birds** Old World flycatchers (Muscicapidae), monarch flycatchers (Monarchidae), paradise kingfishers (Alcedinidae), motmots (Momotidae)

**Description**
- Plumage iridescent black or matte gray
- Wings long; tail long, often with highly modified rectrices
- Body medium-sized, ovoid, with upright posture
- Bill stout, hooked, arched, with well-developed rictal bristles in some species
- Head medium-sized; neck short, thick
- Legs short; feet small
- Sexes similar

**Habitat** The drongos live primarily in wooded habitats, ranging from dense forest to open savanna and gardens.

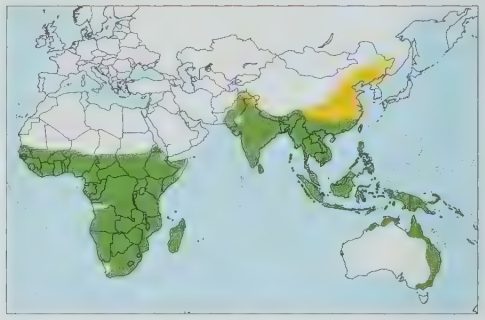
**Food** Dicrurids are primarily insectivorous. They perch in the open and sally frequently for insects. Many forage with mixed-species flocks, catching insects that are flushed by other birds and acting as predator sentinels for the flocks. Some are kleptoparasites of other birds.

**Breeding** Despite being common throughout their range, our understanding of dicrurid breeding biology comes from only a few species. Drongos appear to be monogamous with biparental care and aggressive defense of the nest. Drongo nests are cups constructed of grasses, rootlets, tendrils, and other vegetative material, either suspended from a horizontal fork, or placed on a horizontal branch or ledge. Nests are usually held together and in place by spiderwebs, and are often decorated with lichen. Females lay 1 to 5 eggs. Both members of the pair construct the nest, incubate eggs, and feed chicks. Incubation takes 13 to 20 days, and the nestlings leave the nest at 15 to 22 days post-hatch. Fledglings become independent of further parental care within four to seven weeks post-fledging.



Greater Racket-tailed Drongo, *Dicrurus paradiseus*. Kaeng Krachan NP, Thailand. © Alex Vargas.





**Conservation** Habitat loss compounded by naturally small ranges poses the greatest threat to the dicrurids, five species (19%) of which are of conservation concern (3 NT, 2 EN). The endangered Grand Comoro Drongo *Dicrurus fuscipennis* is found in a narrow band of habitat on the side of an active volcano on the island of Grand Comoro. The Mayotte Drongo *D. waldenii* has also suffered greatly from habitat loss on its home island of Mayotte in the Indian Ocean.

**Relationships** Dicruridae is part of the corvoid radiation of oscine passerines. Though relationships differ among studies, and especially in those with different taxonomic sampling (Fuchs *et al.* 2006c, Pasquet *et al.* 2007, Jønsson *et al.* 2008b, Norman *et al.* 2009), there is consensus that Dicruridae is allied with a group informally known as "crown corvoids," and is sister either to that clade (Barker *et al.* 2004, Reddy & Cracraft 2007, Jønsson *et al.* 2011) or to that clade with the exclusion of Rhipiduridae (Aggerbeck *et al.* 2014). For relationships among the *Dicrurus* species see Pasquet *et al.* (2007).

Most drongos are sleek and shiny black flycatching birds of Africa, Asia, and Australia, the species usually distinguished by rackets or distinctive bends or warps in the tail feathers and crests or bristles on the head. Generally tolerant of people, and sitting for long times on a perch between sallies after passing insect prey, these birds are familiar, but poorly studied. They make a great variety of sounds, from harsh mechanical sounds to ringing whistles and chirps, often delivered in a simple repeated way that suggests the song of some unfamiliar bird. Other species deliver a bewildering array of notes in a chattering cacophony that often includes mimicry of syllables from the songs of other local bird species.



Lesser Racket-tailed Drongo, *Dicrurus remifer*. Fraser's Hill, Pahang, Malaysia. © Con Foley.

*DICRURUS*
25 species



*D. densus*
Wallacean Drongo

Passeriformes, Corvoid Oscines

# IFRITIDAE
Ifrita

1 genus · 1 species

**Related Families** Melampittidae (melampittas), Paradisaeidae (birds-of-paradise), Corcoracidae (Australian mudnesters), Monarchidae (monarch flycatchers), Laniidae (shrikes), Corvidae (crows and jays)

**Similar Birds** Ovenbirds (Furnuriidae), antbirds (Thamnophilidae)

**Description**
- Plumage dark, with olive brown back and paler ochre underparts, bold dark eye-stripe with pale eye-ring and eye-line, and bright, slightly iridescent blue crown
- Wings medium-short, rounded; tail medium-short
- Body small, ovoid, with hunched posture
- Bill very slightly decurved, medium in depth and length
- Head medium-small; neck short, thick
- Legs and feet medium-long
- Female like male with slightly darker eye-line

**Habitat** The Ifrita lives in montane forests, where it is particularly fond of sites where moss is abundant on trees.

**Food** This species mainly forages on small insects and other invertebrates that it gleans from branches and leaves, but it also takes some fruit. As it forages, it scales from low trunks to high branch tips, probing into crevices of branches and bark in search of food.

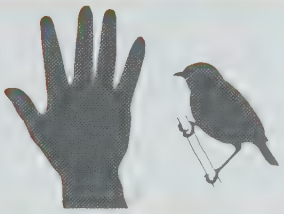
**Breeding** Ifritas build a deep bulky cup nest of moss, leaves, ferns, and rootlets low in a small tree or shrub. Females lay 1 egg per clutch. Nothing is known about the mating system, division of parental effort, incubation periods, or nestling development in this species.

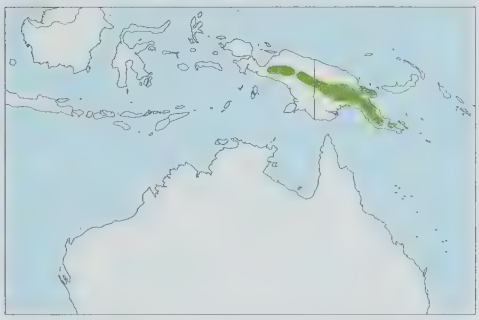
**Conservation** The Ifrita faces no immediate conservation concerns, as it is assumed to have a relatively large, stable population.



Ifrita, *Ifrita kowaldi*.
Kumul Lodge, Papua New Guinea. © Maxime Aliaga.

**Relationships** Ifritidae is part of superfamily Corvoidea of the oscine passerines. This species has a complicated taxonomic history. Having variously been placed with Orthonychidae, Muscicapidae, Maluridae, Eupetidae or Monarchidae (e.g., Sibley & Ahlquist 1990, Clements *et al.* 2014) among others, its position is still unclear, although there is consensus that it is part of the "crown corvoid" radiation (Norman *et al.* 2009, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014). While Dumbacher *et al.* (2008) found it to be sister to Melampittidae, Norman *et al.* (2009) found it sister to Monarchidae, Jønsson *et al.* (2011) found it sister to a clade made up of Monarchidae, Laniidae, and Corvidae, and Aggerbeck *et al.* (2014) found it sister to a clade that included Melampittidae, Paradisaeidae, and Corcoracidae. Perhaps as we learn more about the biology of this distinctive bird, its sister relationships will become better understood as well.





An enigmatic species from New Guinea, the Ifrita is largely arboreal, creeping up moss-covered trunks and branches, and gleaning insects much like a nuthatch. Like a number of other species in New Guinea from at least three different families, the Ifrita sequesters toxins into its feathers and skin from beetles in its diet. This defense against predators is borne out by the mountain peoples of New Guinea, who know the Ifrita to be bitter and toxic. Its name derives not from a local name but from that of some lesser sprits in Islamic mythology. Its songs are simple, sounding at times like the wheezy, ringing whistled notes of a wren with the cadence of a titmouse.



Ifrita, *Ifrita kowaldi*. Kumul Lodge, Papua New Guinea. © Maxime Aliaga.

*IFRITA*
1 species



*I. kowaldi*
Ifrita

# MONARCHIDAE
## Monarch Flycatchers

16 genera • 86 species

**Related Families** Corvidae (crows and jays), Laniidae (shrikes), Platylophidae (Shrike-jay), Melampittidae (melampittas), Ifritidae (Ifrita)

**Similar Birds** Other flycatchers (Tyrannidae, Muscicapidae)

**Description**
- Plumage typically dark above and lighter below, often with black, white, blue, reddish, and occasionally yellow, often with a slight crest
- Wings medium-long and pointed; tail long to very long
- Body medium-sized, ovoid, with upright posture in most
- Bill slightly dorso-ventrally flattened, with slight terminal hook, often inflated slightly and light blue
- Head medium to large; neck thick and short
- Legs medium-short; feet small in most
- Males often more brightly colored and boldly patterned

**Habitat** The monarch flycatchers live in a variety of forest and woodland habitats, from mangroves, to dense rainforest, to savannas.

**Food** Monarchids are insectivorous, with occasional small vertebrates and even rarely, fruits and seeds being eaten. Prey is apprehended either through gleaning from leaves and branches or through brief aerial sallying and hover-gleaning.

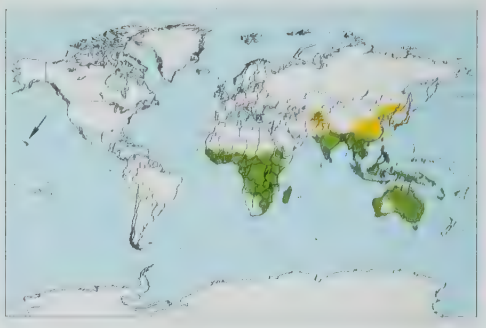
**Breeding** Most monarchids are monogamous with biparental care. Nests are small, simple, open cups usually placed in the fork of a branch. Nests are made of bark fibers, vine tendrils, grasses, spiderwebs, moss, and stems. Females lay 1 to 5 eggs, with larger clutches in the more northerly species. Both male and female participate in all aspects of parental care, including nest-building, incubation, feeding the chicks, and territory defense. Incubation takes 12 to 18 days and nestlings leave the nest 7 to 20 days (most species 12 to 16 days) post-hatch. The fledglings are fed by the parents for up to six weeks post-fledging.

**Conservation** Habitat loss and the introduction of non-native predators are the primary threats facing monarchids, of which 32 species (37%) are of conservation concern (13 NT, 9 VU, 5 EN, 5 CR). The Fatuhiva Monarch *Pomarea whitneyi*



Indian Paradise-flycatcher, *Terpsiphone paradisi*. Ganeshgudi, Karnataka, India. © Varun HB.





Throughout the southern half of the Old World, and on Pacific islands all the way to Hawaii, there is an array of medium-sized sallying flycatchers, with bills generally a little larger (and sometimes with a tell-tale gray-blue cast), and tails a little longer, than other flycatchers in the same woods. These are the monarch flycatchers, elegant birds with large patches of earth-tones, blue, and rarely yellow in their plumage. Many genera fan their tails, with displays of varying showiness. Even in species with the most spectacularly adorned males, both sexes take part in all aspects of parental care. Monarchids often reveal themselves to be adept acrobats when pursuing aerial prey.



Magpie-lark, *Grallina cyanoleuca*. Royal NP, New South Wales, Australia. © Drew Fulton



Broad-billed Flycatcher, *Myiagra ruficollis*. Crab Creek, Broome Bird Observatory, Western Australia. © Drew Fulton.

of French Polynesia, Black-chinned Monarch *Monarcha boanensis* of Indonesia, and the Cerulean Paradise-flycatcher *Eutrichomyias rowleyi*, also from Indonesia, are all island endemics for which these threats pose particular challenges, and all are listed as critically endangered. Some species of monarch flycatcher have also become extinct in recent history, including the Guam Flycatcher *Myiagra freycineti*, the Ua Pou Monarch *Pomarea mira*, and the Eiao Monarch *Pomarea fluxa*; all had small island populations that could not sustain the impacts of changed habitat and introduced predators.

Relationships Monarchidae is one of the "crown corvoid" families (Barker *et al.* 2004, Fuchs *et al.* 2006c, Driskell *et al.* 2007, Reddy & Cracraft 2007, Irestedt *et al.* 2008, Irestedt & Ohlson 2008, Irestedt *et al.* 2009b, Jønsson *et al.* 2008b, Norman *et al.* 2009, Jønsson *et al.* 2011). Within this group, its position is not well resolved, though it may be sister to Melampittidae (Barker *et al.* 2004), to Ifritidae (Norman *et al.* 2009), or to a clade made up of Corvidae plus Laniidae (Reddy & Cracraft 2007), either including Platylophidae (Aggerbeck *et al.* 2014) or without it (Jønsson *et al.* 2011). The genus *Grallina* has at times been considered its own family, though genetic evidence strongly places it within Monarchidae (Jønsson *et al.* 2011), where it is sometimes recognized as a distinct subfamily (e.g., Cracraft 2014).



Black-naped Monarch, *Hypothymis azurea*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.



Shining Flycatcher, *Myiagra alecto*. Cape Tribulation, Daintree NP, Queensland, Australia. © Mark A. Chappell.



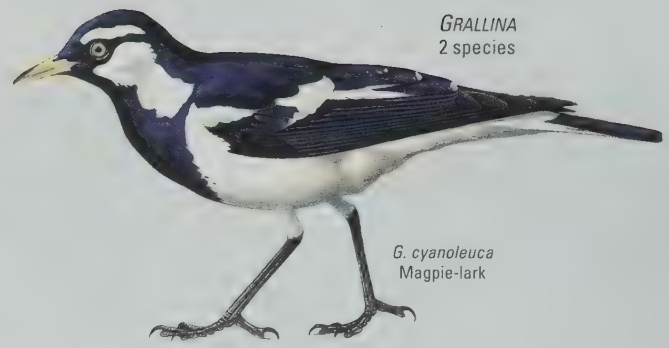
*MYIAGRA*
16 species

*M. nana*
Paperbark Flycatcher



*ARSES*
4 species

*A. telescopthalmus*
Frilled Monarch



*GRALLINA*
2 species

*G. cyanoleuca*
Magpie-lark



*SYMPOSIACHRUS*
19 species

*S. vidua*
White-collared Monarch



*CARTERORNIS*
3 species

*C. pileatus*
White-naped Monarch



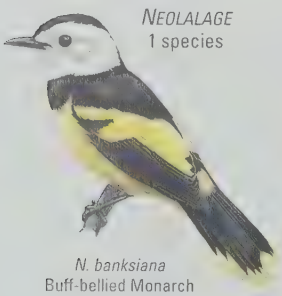
*CHASIEMPIS*
1 species

*C. sandwichensis*
Elepaio



*POMAREA*
5 species

*P. nigra*
Tahiti Monarch



*NEOLALAGE*
1 species

*N. banksiana*
Buff-bellied Monarch



*MAYRORNIS*
3 species

*M. lessoni*
Slaty Monarch



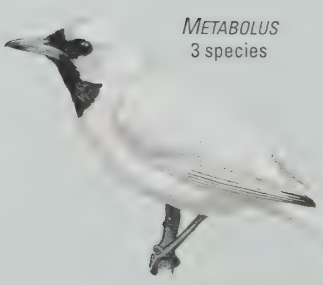
*CLYTORHYNCHUS*
4 species

*C. nigrogularis*
Black-faced Shrikebill



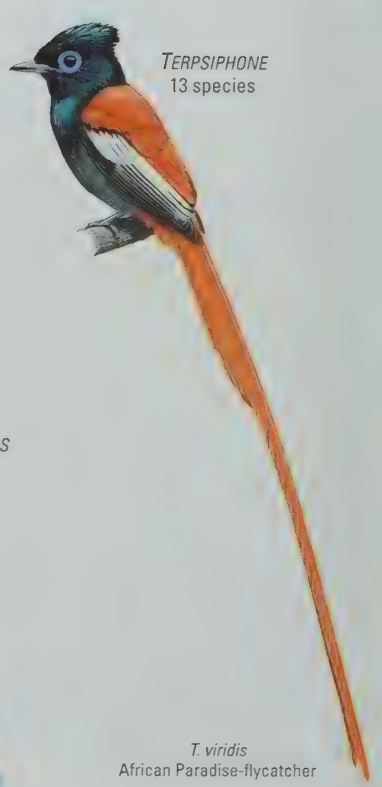
*MONARCHA*
6 species

*M. richardsii*
White-capped Monarch



*METABOLUS*
3 species

*M. rugensis*
Chuuk Monarch



*TERPSIPHONE*
13 species

*T. viridis*
African Paradise-flycatcher



*TROCHOCERCUS*
2 species

*T. cyanomelas*
Blue-mantled Paradise-flycatcher



*HYPOTHYMIS*
3 species

*H. azurea*
Black-naped Monarch



*EUTRICHOMYIAS*
1 species

*E. rowleyi*
Cerulean Paradise-flycatcher

Passeriformes, Corvoid Oscines

# PLATYLOPHIDAE

Shrike-jay

1 genus · 1 species

**Related Families** Laniidae (shrikes), Ifritidae (Ifrita), Monarchidae (monarch flycatchers), Corvidae (crows and jays), Paradisaeidae (birds-of-paradise), Corcoracidae (Australian mud-nesters)

**Similar Birds** Jays (Corvidae), helmet-shrikes (Vangidae)

**Description**

- Plumage dark, with distinctive white patch on side of neck and long, few-feathered crest
- Wings rounded; tail medium-long, graduated
- Body size medium, ovoid, with hunched posture
- Bill medium-short with slight hook
- Head large, with distinctive, long crest; neck short, thick
- Legs medium-short; feet small
- Males black, females dark brown

**Habitat** The Shrike-jay lives in lowland forests of tropical Southeast Asia.

**Food** *Platylophus* feeds mainly on a variety of invertebrates, including many groups of insects, mostly taken in the undergrowth and lower canopy of the forest.

**Breeding** Very little is known of the breeding biology of the Shrike-jay, although it is presumed to be monogamous with biparental care. The nest consists of a shallow cup built low in a tree or bush, consisting of sticks and other materials. Females usually lay 2 eggs. Nothing is known of incubation or other parental care.

**Conservation** The Shrike-jay is thought to be experiencing rapid declines across much of its range, primarily the result of habitat loss from logging, and is thus considered near threatened (100%, 1 NT). It is still locally common in parts of its range.



Shrike-jay, *Platylophus galericulatus*.
Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

**Relationships** Platylophidae is part of the corvoid radiation of oscine passerines. This species was long considered to be a member of Corvidae, but recent morphological (Manegold 2008b) and molecular (Jønsson *et al.* 2008b, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014) studies show that it is quite distinct from Corvidae but still within the "crown corvoid" group, either sister to Laniidae (Jønsson *et al.* 2008b, Aggerbeck *et al.* 2014), or in a three-way polytomy that includes all the crown corvoids except Rhipiduridae and Dicruridae (Jønsson *et al.* 2011).



The Shrike-jay *Platylophus galericulatus*, while superficially similar to many of the jays in Corvidae, has long had uncertain affinities. Lacking the distinct nasal tufts of most corvids, and possessing a strikingly long, few-feathered crest, this bird of Sumatra, Borneo, Java, and the Malay Peninsula is otherwise poorly known. Quite social, Shrike-jays move through the forest without the assertive demeanor of many corvids, the group's passage revealed only by the sound of their soft calls, delivered with a machine-gun cadence, receding into the forest.



Shrike-jay, *Platylophus galericulatus*. Poring Hot Springs, Sabah, Borneo. © Rob Hutchinson / Birdtour Asia.

*PLATYLOPHUS*
1 species



*P. galericulatus*
Shrike-jay

# LANIIDAE
## Shrikes

4 genera • 31 species

**Related Families** Corvidae (crows and jays), Platylophidae (Shrike-jay), Paradisaeidae (birds-of-paradise)

**Similar Birds** Butcherbirds (Artamidae), bush-shrikes (Malaconotidae), falconets (Falconidae), mockingbirds (Mimidae), shrike-tyrants (Tyrannidae)

**Description**

- Plumage typically gray or brown above and light below, with distinct black face "mask" and black and white remiges; some entirely black or strongly patterned black and white
- Wings medium-long; tail medium to very long, narrow
- Body medium-sized, ovoid, with upright posture
- Bill medium length, deep, hooked, sometimes with tomial "tooth"
- Head large; neck thick, short
- Legs and toes medium to long, thick, with sharp claws on feet
- Sexes similar

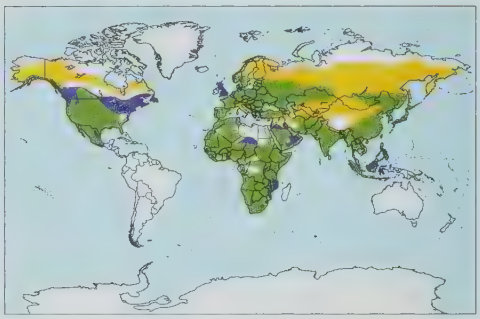
**Habitat** Shrikes live in a variety of edge and open habitats, including grassland, semi-arid desert, savanna, and open forest. Some taller perches, usually bushes, snags, or small trees, must be present as perches and prey caches.

**Food** Shrikes have a diverse animal diet that varies among species and with relative prey abundance. The diet of many shrikes is composed mainly of insects; however, a significant portion of their diet also consists of vertebrate prey. To kill vertebrate prey, they sever the spinal cord at the base of the skull with their sharp bills. Shrikes most often impale prey on thorns, or wedge items between branches to hold them while tearing off manageable portions. Northern Shrikes have been observed taking Rock Pigeons, a prey item much larger and heavier than themselves.



Magpie-Shrike, *Urolestes melanoleucus*. Kruger NP, South Africa. © Con Foley.





**Breeding** Most laniids are monogamous, very rarely polygynous, with biparental care. At least *Eurocephalus*, *Corvinella* species, and the Gray-backed Fiscal *Lanius excubitorius* are cooperative breeders, with group sizes of up to nine individuals, still with a single breeding pair. Most shrike nests are bulky open cups constructed of grass, feathers, hair, and sticks, not well hidden in the bushes and trees in which they are placed. Shrikes generally lay 2 to 9 eggs, with more being laid in the northern latitudes. The female generally constructs most of the nest while the male brings material. Only the female incubates eggs, and both parents provision the young. Incubation takes 15 to 20 days, and the

Shrikes are passerines that evolved to become diurnal birds of prey, and their appearance and behavior converge on small raptors in many respects: their plumages of black, gray, white, and often earth tones; their large-shouldered, short-necked, large-headed appearance; and, except for a few cooperatively breeding species, their limited vocalization. With the strong feet and sharp, strong bill of a predator, shrikes take prey ranging from birds and amphibians to large insects, often storing them for later consumption on the spines of shrubs or barbed wire. At least one species, Northern Shrike *Lanius excubitor*, has been reported imitating the calls of smaller birds to lure them in as prey.



Northern Shrike, *Lanius excubitor*. Atigun Gorge, North Slope, Alaska, USA. © Ian Davies.

young generally leave the nest after another 17 to 20 days.

**Conservation** Habitat loss compounded by small population size is the primary threats facing the two species (6%) of laniids that are of conservation concern (1 NT, 1 CR). Newton's Fiscal *Lanius newtoni*, found only on the island of São Tomé, is critically endangered, and is believed to have a population of fewer than 50 individuals. However, it is also believed that most of the primary forest inhabited by this species is currently safe from further disturbance. The Mountain Shrike *Lanius validirostris*, endemic to the Philippines, is listed as near threatened primarily because of its restricted range.

**Relationships** Laniidae is part of the corvoid radiation of oscine passerines. Within this radiation, it is part of the "crown corvoids" and is often found to be sister to Corvidae (Barker *et al.* 2004, Driskell *et al.* 2007, Reddy & Cracraft 2007, Irestedt & Ohlson 2008, Irestedt *et al.* 2008). Most of these studies do not include *Platylophus*, the Shrike-jay; when that is included, Laniidae is sometimes sister to Platylophidae, with the two together sister to Corvidae (Aggerbeck *et al.* 2014) or Paradisaeidae (Jønsson *et al.* 2008b), but Jønsson *et al.* (2011) found Platylophidae sister to a much larger group of crown corvoids and Laniidae sister to Corvidae.



Red-backed Shrike, *Lanius collurio*. Mazovia, Poland. © Paweł Wacławik.



# CORVIDAE
## Crows and Jays

21 genera • 123 species

**Related Families** Laniidae (shrikes), Platylophidae (Shrike-jay)

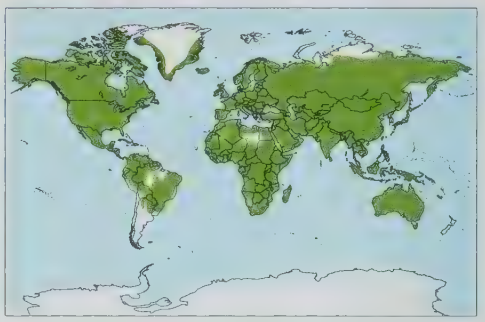
**Similar Birds** Currawongs (Artamidae), blackbirds and grackles (Icteridae, Sturnidae, Turdidae), Shrike-jay (Platylophidae), fruitcrows and umbrellabirds (Cotingidae), manucodes (Paradisaeidae)

**Description**
- Plumage variable, but often with black, white, gray, blue, or green, most often in bold, large patterns, and some with silky iridescence
- Wings rounded; tail ranging from medium in crows and ravens to very long in magpies
- Body medium to extremely large (including the largest passerine, Common Raven *Corvus corax*), ovoid, often with hunched posture
- Bill medium length, often inflated, usually with feathers covering nostrils
- Head large; neck thick
- Legs medium to long; feet large with long claws
- Sexes generally similar



Pinyon Jay, *Gymnorhinus cyanocephalus*.
Near Great Basin NP, Nevada, USA. © Mark A. Chappell.





This family includes some of the most familiar birds in the world. Ravens and crows figure in the mythologies of many peoples worldwide, and they are well known for their sociality and intelligence. The family boasts the most advanced avian tool-user, the New Caledonian Crow *Corvus moneduloides*. Somewhat like parrots, corvids have calls that commonly are raucous and harsh, but many are capable mimics of a wide variety of other species' syllables, sometimes strung together in a "whisper song" audible only at close range. Dismissed often as common familiar black birds, corvids include some stunningly beautiful birds; some of the magpies and treepies are among the most elegant and graceful of all the world's birds.

**Habitat** Corvids occupy virtually every terrestrial habitat on Earth, including Arctic tundra, arid deserts, urban streets, and tropical rainforest. Having likely dispersed around the world over millions of years from an Australasian core, it is odd that they never reached New Zealand or Patagonia or disappeared from them both.

**Food** Corvids are omnivorous, opportunistic feeders. Many, such as ravens, crows, and most jays, are generalists, and some are prodigious nest-robbers; others, such as nutcrackers (*Nucifraga*) and Pinyon Jay *Gymnorhinus cyanocephalus*, specialize on extracting seeds from conifer cones, and most of the north-temperate jays are attuned to mast production, especially in oaks. Larger species, like the crows and ravens in particular and the *Pica* magpies, often scavenge animal carcasses. Most corvids cache excess food for later use; many have impressive spatial memories to find their caches, and some even breed primarily while using cached food.

**Breeding** Corvid reproductive strategies are highly varied. Within the family, most species are monogamous, a few species are colonial, and a great many are cooperative breeders. The nests of most corvids are open cup structures



Yucatan Jay, *Cyanocorax yucatanicus*. Puerto Aventuras, Quintana Roo, Mexico. © Ian Davies.

built mostly of sticks placed in trees or bushes or on cliff ledges. Some species nest in cavities or burrows. Females alone incubate, but male and female (and helpers) actively participate in all other aspects of parental care. Corvids lay 1 to 9 eggs, most commonly 2 to 4. Incubation takes around 17 days, and the nestlings are generally in the nest from 15 to 45 days. Fledglings are fed by the parents for up to about ten weeks post-fledging, much longer in the cooperative-breeding species.

Conservation Habitat loss, the main risk to corvids, threatens 26 species (21%; 13 NT, 8 VU, 2 EN, 2 CR, 1 EW). The Hawaiian Crow or 'Alala *Corvus hawaiiensis* is extinct in the wild and completely reliant on a captive breeding program to avoid extinction. The two critically endangered species, both island endemics, are the Banggai Crow *C. unicolor* and Mariana Crow *C. kubaryi*; the latter is further imperiled by predation by introduced cats and Brown Tree Snakes *Boiga irregularis*. The endangered Stresemann's Bush-crow *Zavattariornis stresemanni* and Flores Crow *C. florensis* both have very small ranges, the former in deep-soil areas of the cool highlands of Ethiopia and the other on the tiny Indonesian island of Flores.

Relationships Corvidae is one of the "crown corvoid" groups within Corvoidea (Barker *et al.* 2004, Driskell *et al.* 2007, Irestedt *et al.* 2008, Irestedt & Ohlson 2008, Irestedt *et al.* 2011). Although the position of Corvidae within this group has not always been clear (Fuchs *et al.* 2006c, Irestedt *et al.* 2008, Jønsson *et al.* 2008b), it is most likely sister to Laniidae plus Platylophidae (Aggerbeck *et al.* 2014), or to Laniidae (Reddy & Cracraft 2007, Jønsson *et al.* 2011). Unlike many families in the corvoid radiation, Corvidae is one of the few that has diversified extensively in the New World (Ericson *et al.* 2005, Bonaccorso & Peterson 2007, Bonaccorso *et al.* 2010), away from Africa and Australasia, the two centers of corvoid diversity.



Stresemann's Bush Crow, *Zavattariornis stresemanni*. Mega, Yabelo, Oromia, Ethiopia. © Ian Davies.



Racket-tailed Treepie, *Crypsirina temia*. Kaeng Krachan NP, Thailand. © Michael Gillam.


PLATYSMURUS
1 species
P. leucopterus
Black Magpie
TEMNURUS
1 species
T. temnurus
Ratchet-tailed Treepie
CRYPSIRINA
2 species
C. temia
Racket-tailed Treepie
DENDROCITTA
7 species
D. vagabunda
Rufous Treepie
PYRRHOCORAX
2 species
P. pyrrhocorax
Red-billed Chough
UROCISSA
5 species
U. erythroryncha
Red-billed Blue Magpie
CISSA
3 species
C. chinensis
Common Green Magpie
PERISOREUS
3 species
P. infaustus
Siberian Jay
CYANOPICA
2 species
C. cyanus
Asian Azure-winged Magpie
GARRULUS
3 species
G. glandarius
Eurasian Jay
ZAVATTARIORNIS
1 species
Z. stresemanni
Stresemann's Bush Crow
PTILOSTOMUS
1 species
P. afer
Piapiac
PODOCES
4 species
P. hendersoni
Henderson's Ground Jay
PICA
4 species
P. pica
Common Magpie
NUCIFRAGA
3 species
N. caryocatactes
Spotted Nutcracker
CORVUS
44 species
C. corax
Common Raven
CYANOLYCA
9 species
C. armillata
Black-collared Jay
GYMNORHINUS
1 species
G. cyanocephalus
Pinyon Jay
APHELOCOMA
5 species
A. californica
Western Scrub Jay
CYANOCITTA
2 species
C. cristata
Blue Jay
CYANOCORAX
20 species
C. dickeyi
Tufted Jay

Passeriformes, Corvoid Oscines

# MELAMPITTIDAE
## Melampittas

2 genera • 2 species

Related Families Corcoracidae (Australian mudnesters), Paradisaeidae (birds-of-paradise)

Similar Birds Ant-thrushes (Formicariidae), tapaculos (Rhinocryptidae), antbirds (Thamnophilidae), parotias (Paradisaeidae)

Description
- Plumage predominantly black with patches of dark rufous-brown in *M. gigantea*
- Wings short, rounded; tail short to medium
- Body medium-sized, ovoid, with hunched posture
- Bill medium length, straight, medium to deep
- Head medium to large; neck short, thick
- Legs medium to long; feet medium, toes thick
- Males with red eye in *M. lugubris*; otherwise sexes similar

Habitat The melampittas live in montane rainforests.

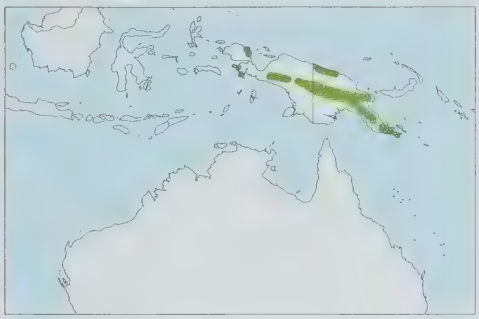
Food The Lesser Melampitta *Melampitta lugubris* is omnivorous, mostly feeding on insects, worms, snails, and other invertebrates, but also on frogs and fruit, found on the forest floor by flipping leaves and probing the ground with its bill. No information on the diet of the Greater Melampitta *Megalampitta gigantea* exists, but it appears to spend less time on the ground.

Breeding The breeding of *Megalampitta* is known only from anecdotal information from local people, who describe the nest as a large basket of vines, suspended below ground level in a sinkhole in their limestone karst habitat. *Melampitta* is better studied, building a domed nest of live moss interwoven with roots, tendrils, and fern fronds about 2 m up on a tree-fern trunk. Females lay a single-egg clutch, and they incubate and brood on their own, fed by the males. Chicks are fed by both parents. Incubation is reported to take surprisingly long, at least 27 days, and fledging occurs at about 35 days post-hatch.



Lesser Melampitta, *Melampitta lugubris*.
Kumul Lodge, Papua New Guinea. © Jon Irvine.





This pair of species endemic to New Guinea are forest birds of the island's limestone mountains. The Greater Melampitta has stiffened wing and tail feathers that may be adaptations to its habit of roosting and nesting in karst sinkholes. This and other anatomical and behavioral differences suggest that these two melampittas may not be very closely related. Reminiscent of glossy-black ant-thrushes, the melampittas are seldom seen and thus little known. They are largely terrestrial birds that forage on the forest floor, hopping and running across the ground, and digging and tossing leaves aside as they go.

Conservation Neither species of melampittid is of immediate conservation concern.

Relationships Melampittidae is part of the corvoid radiation of oscine passerines. The two species in this family have always been a challenge to classify, having variously been placed in different families, including Timaliidae and Orthonychidae (Schodde & Christidis 2014). Recent studies based on DNA sequence data have started to clarify the position of Melampittidae, with several studies placing it deep within the "crown corvoids" (Barker *et al.* 2004, Reddy & Cracraft 2007, Irestedt *et al.* 2008), sister either to Corcoracidae (Reddy & Cracraft 2007) or to Paradisaeidae (Jønsson *et al.* 2011), or sister to the clade made up of Paradisaeidae and Corcoracidae together (Aggerbeck *et al.* 2014).



Lesser Melampitta, *Melampitta lugubris*. Kumul Lodge, Papua New Guinea. © Erik Enbody.

*MELAMPITTA*
1 species



*M. lugubris*
Lesser Melampitta

*MEGALAMPITTA*
1 species



*M. gigantea*
Greater Melampitta

# CORCORACIDAE
## Australian Mudnesters

2 genera • 2 species

**Related Families** Paradisaeidae (birds-of-paradise), Melampittidae (melampittas)

**Similar Birds** Choughs (Corvidae), *Turdoides* babblers (Timaliidae), bristlebirds (Dasyornithidae), saltators (Thraupidae), towhees (Passerellidae)

**Description**
- Plumage entirely glossy black with white in primaries, or frosted gray with brown wings
- Wings medium-long, broad in *Corcorax*, shorter in *Struthidea*; tail medium-long in *Corcorax*, long in *Struthidea*
- Body medium-sized, ovoid, with hunched and generally horizontal posture
- Bill medium-long, decurved, and pointed in *Corcorax*; short, inflated, conical, and slightly decurved in *Struthidea*
- Head small with medium neck in *Corcorax*, large with thick short neck in *Struthidea*
- Legs medium-long; feet medium to large
- Sexes similar

**Habitat** The corcoracids live in relatively open woodland, known in eastern Australia as mallee, from the tropics to the temperate zone. The Apostlebird *Struthidea cinerea* prefers drier habitats, extending into more arid scrubland in the western part of its range.

**Food** Corcoracids have a varied diet, consisting in the warmer months mainly of insects and other arthropods and invertebrates. They also forage on seeds, small vertebrates, and aquatic invertebrates. Both species spend much of their time foraging on the ground, and use their bills to forage through leaf litter and under branches and other material.

**Breeding** Both corcoracids are monogamous, obligate cooperative breeders. Group size in these species ranges from 4 to as many as 20 helpers. As in most cooperatively breeding birds, the helpers are usually retained young from previous breeding attempts of the breeding pair. Unlike in other cooperatively breeding species, whose helpers are predominantly male,



White-winged Chough, *Corcorax melanorhamphos* Sydney, Australia © John McKean





No other family of passerines packs so much morphological divergence into only two species. Though it would be hard to guess their sister relationship just by looking at them, both occur in the same mallee habitats of Australia, and both build bowl-shaped mud nests that are attended by bands of cooperative relatives. Their complex social lives are mediated vocally by a medley of ongoing chatters and chortles in the Apostlebird and shrieks and cries in the White-winged Chough (not to be confused with the corvids of the same name). The latter also adds a ventriloquial song, a high, ringing, descending whistle that can seem very far or close depending on which way the calling bird is turning.



Apostlebird, *Struthidea cinerea* Lake Cargelligo, New South Wales, Australia © Nevil Lazarus

both young male and female corcoracids stay with the group. Both species construct a deep cup or bowl nest built of mud (with walls incorporating grass into the mud). Nests are usually placed on a broad horizontal branch. Nests can take several days to construct, and can be built at any time of year. Females generally lay 3 to 5 eggs. Both male and female members of the group participate in all aspects of parental care, including nest construction, incubation, and feeding young. Incubation takes 19 to 20 days, and the young leave the nest after another 18 to 30 days but are not fully independent of care from their parents and group members for at least another six months or so.

**Conservation** Neither species of corcoracid faces any immediate conservation concerns.

**Relationships** Corcoracidae is in the corvoid radiation of oscine passerines. Despite their outwardly divergent morphologies, the two corcoracid have generally been placed together in the same family, based partly on their similar construction of mud nests; for the same reason, they were also often placed near the *Grallina* magpie-larks, which were sometimes considered a separate family, Grallinidae, but are now known to belong in Monarchidae. Corcoracidae is a "crown corvoid" family (Barker *et al.* 2004, Driskell *et al.* 2007, Reddy & Cracraft 2007, Irestedt *et al.* 2008, Jønsson *et al.* 2008b, Norman *et al.* 2009, Jønsson *et al.* 2011). Studies with extensive taxon sampling suggest that Corocacidae is sister to Paradisaeidae (Aggerbeck *et al.* 2014), to Paradisaeidae and Melampittidae taken as a clade together (Jønsson *et al.* 2011), or to Melampittidae alone (Reddy & Cracraft 2007).



White-winged Chough, *Corcorax melanorhamphos*. Hattah, Victoria, Australia. © Graeme Chapman.

*CORCORAX*
1 species



*C. melanoramphos*
White-winged Chough

*STRUTHIDEA*
1 species



*S. cinerea*
Apostlebird

# PARADISAEIDAE
## Birds-of-paradise

13 genera • 39 species

**Related Families** Laniidae (shrikes), Platylophidae (Shrike-jay), Corcoracidae (Australian mud-nesters), Melampittidae (melampittas)

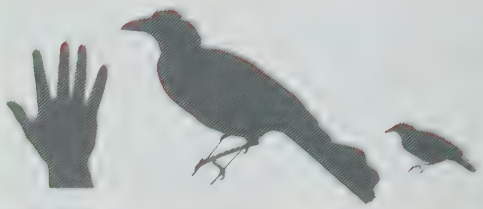
**Similar Birds** Honeyeaters (Meliphagidae), satinbirds (Cnemophilidae), mynas (Sturnidae), bowerbirds (Ptilonorhynchidae)

**Description**

- Plumage ranging from glossy black to red, green, yellow, and orange; females muted brown, many with barred undersides
- Wings generally short and rounded; tail short to extremely long, often with modified rectrices
- Body medium to large, ovoid, with hunched and often horizontal posture
- Bill with feathered nostrils, stout and jay-like to long, thin, and decurved
- Head medium-sized; neck medium-thick
- Legs short to medium; feet large
- Strongly dimorphic; males more brightly colored and boldly patterned, many adorned with highly modified feathers



Victoria's Riflebird, *Lophorina victoriae*.
Atherton Tablelands, Queensland, Australia © Mark A. Chappell





**Habitat** The birds-of-paradise live in rainforest habitats along a wide elevational gradient. A few species reside in more-open woodland habitats.

**Food** Paradisaeids feed on many different foods. Some species are exclusively frugivorous, taking an array of fruits and berries or, in some cases, specializing on figs. Many other species incorporate insects and other arthropods into their diet. The *Epimachus* sicklebills, with their long, thin, decurved bills, forage for insects in bark crevices and in dead and rotting wood.

**Breeding** Most paradisaeids are polygynous with female-only parental care, but a few species, such as the manucodes and Paradise Crow *Lycocorax pyrrhopterus*, are socially monogamous. Particularly in polygynous species, males perform elaborate and highly stereotyped courtship displays. The type of display varies substantially among species, and display behaviors have evolved to show off specialized plumes and iridescent plumage patches and brightly colored skin in bizarre and exaggerated fashion. Many of the polygynous birds-of-paradise practice lek or dispersed lek breeding, in which males gather at specific sites that females may visit in order to compare the display quality of multiple males at one time. Nests of birds-of-paradise are either suspended loose cups or bulky cups constructed of stems, ferns, mosses, and other vegetation. Manucodes construct smaller, shallower, suspended cup nests. Females lay 1 to 3 eggs, most frequently 1 or 2. Only in the monogamous manucodes and Paradise Crow do males help with the breeding effort; otherwise, females of polygynous species undertake all

Nowhere is the tremendous creative potential of sexual selection better displayed than by this family of songbirds endemic to the wet forests of New Guinea and northeastern Australia. Females are invariably clothed in earth tones, often with black barring, and most possess a strong, slightly decurved bill. Their uniformity makes the males that much more astonishing. Some have feathers in springy coils, others have profuse antennae on the rump, and still others have long breezy banners hanging from their napes. Incorporating this spectacular diversity of feathers into their displays with seemingly endless creativity, these males become feathered dancers, bizarre wind-up toys, or touchy-feely trunk creepers in their efforts to attract a mate.



Lesser Bird-of-paradise, *Paradisaea minor*.
Mount Hagen, Papua New Guinea. © Jon Irvine



Wilson's Bird-of-paradise, *Cicinnurus respublica*.
Waigeo Island, West Papua, New Guinea. © Dubi Shapiro

nest-building, incubation, and chick-feeding responsibilities. Incubation takes about 14 to 27 days, and nestlings are in the nest for 14 to 30 days, both periods tending to be longer in more montane species. It appears that fledglings may be fed by their mother for up to three months or so after fledging.

**Conservation** Habitat loss and hunting are the main threats facing paradisaeids, 11 species of which (28%) are of conservation concern (7 NT, 4 VU). The four vulnerable species, Blue Bird-of-paradise *Paradisaea rudolphi*, Goldie's Bird-of-paradise *P. decora*, Black Sicklebill *Epimachus fastuosus*, and Wahnes's Parotia *Parotia wahnesi*, all have small ranges, making them particularly at risk from habitat change taking place generally across New Guinea.

**Relationships** Paradisaeidae is in the corvoid radiation of oscine passerines, part of the "crown corvoids" (Barker *et al.* 2004, Driskell *et al.* 2007, Reddy & Cracraft 2007, Irestedt *et al.* 2008, Irestedt & Ohlson 2008, Norman *et al.* 2009). Consensus on relationships within that group, however, is elusive. Even the recent studies with thorough taxon sampling suggest that Paradisaeidae may be sister to a clade made up of Laniidae plus Platylophidae (Jønsson *et al.* 2008b), in a polytomy with Laniidae and Corcoracidae (Irestedt *et al.* 2009b), sister to Corcoracidae (Aggerbeck *et al.* 2014), or sister to Melampittidae (Jønsson *et al.* 2011). Thus, we are left with a rather long list of related families for Paradisaeidae, and it is hoped that further work will clarify the relationships of this fascinating family. Though previously included within Paradisaeidae, *Cnemophilus* and *Loboparadisaea* have been found to be very distantly related, and not even part of the superfamily Corvoidea, instead most likely closer to Melanocharitidae, Picathartidae, or Callaeidae in their own family, Cnemophilidae (Driskell *et al.* 2007, Reddy & Cracraft 2007, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014).



# Order: Passeriformes, "Basal Passerid Oscines"

## Families: Callaeidae, Notiomystidae, Melanocharitidae, Cnemophilidae, Picathartidae, Eupetidae, Chaetopidae, Petroicidae

The very large number of non-corvoid oscine birds has variously been called Parvorder Passerida (Sibley & Ahlquist (1990) or Infraorder Passerides (Gracraft 2014). (Note that these names need to be distinguished from the small family of Old World sparrows, Passeridae, contained within the passeroid oscines.) The "basal passerid oscines" that we treat here have questionable affinities and are a grouping of convenience for eight taxa that do not fit neatly anywhere else. These eight families do not form a monophyletic clade, and so cannot be recognized as a named group, but they fall outside any of the main superfamilies of the oscine passerines, and are often represented, at least in part, in a ladderized phylogeny, successively sister to the rest of Passerida (Jønsson *et al.* 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014, Barker 2014). The use of the word "basal" in the name for this group once again does not imply anything about any primitive or ancestral character of these birds, only that they represent branches that diverged before many of the more balanced and "bushy" branches of the non-corvoid passerines. These eight families include four (Callaeidae, Notiomystidae, Melanocharitidae, and Cnemophilidae) that were once thought to be part of the corvoid radiation, but instead now seem slightly more likely to be associated near the base of the tree of the remaining non-corvoid passerines (Aggerbeck *et al.* 2014, Barker 2014). The other four families (Picathartidae, Eupetidae, Chaetopidae, and Petroicidae) have persistent indications of affinities among them despite their disjunct Southern Hemisphere distributions (Barker *et al.* 2004, Beresford *et al.* 2005, Jønsson *et al.* 2007, Irestedt & Ohlson 2008).



Drakensberg Rockjumper, *Chaetops aurantius*
Witsieshoek Mountain Lodge, South Africa. © Dubi Shapiro.



Loria's Satinbird, *Cnemophilus loriae*
Mount Michael, Eastern Highlands, Papua New Guinea. © Andrew L. Mack.

Passeriformes, "Basal Passerid Oscines"

# CALLAEIDAE
## New Zealand Wattlebirds

2 genera • 3 species

**Related Families** Notiomystidae (Stitchbird), Petroicidae (Australasian robins), Picathartidae (rockfowls), Chaetopidae (rockjumpers), Cnemophilidae (satinbirds), Melanocharitidae (berrypeckers)

**Similar Birds** New World blackbirds (Icteridae), large jays or crows (Corvidae), honeyeaters (Meliphagidae), starlings (Sturnidae)

**Description**
- Plumage of *Callaeas* light gray with black mask around eye; *Philesturnus* with glossy black plumage and chestnut on back, on rump, and under tail
- Wings short to medium; tail long, rounded
- Body medium to large, cylindrical ovoid
- Bill medium-long, sharply pointed, and slightly decurved in *Philesturnus*; bill short, deep, and curved in *Callaeas*; in both, fleshy wattle at the commissure of upper and lower bill
- In *Callaeas* head small and neck long and thick; in *Philesturnus* head medium and neck short and thick
- Legs and feet medium to long, thick
- Sexes similar in extant species



North Island Saddleback, *Philesturnus rufusater*. Wellington, New Zealand. © B. G. Thomson.





**Habitat** Callaeids are birds of mature native forest with well-developed understory.

**Food** Both genera have varied diets, with kokakos taking mostly fruits and leaves and a few more insects near the breeding season, and saddlebacks taking mostly insects with more fruit and nectar taken seasonally. Kokakos forage most in the tree tops and saddlebacks more on the forest floor and large trunks and branches, where they extract prey by probing with bill-opening and by tearing and prying bits of bark loose.

**Breeding** Pairs are socially monogamous and appear to remain together for several years. Saddlebacks nest in tree cavities, rock crevices, and dense epiphyte clusters, and kokakos most commonly nest in a tree or shrub with a dense overhanging cover. Nests consist of a large cup built of sticks and twigs, often lined with finer material. Callaeids lay 2 or 3 eggs, most commonly 3 in kokakos. Only the female constructs the nest, incubates eggs, and broods the chicks. During incubation, the male feeds the female, and both male and female feed the chicks. Incubation generally takes 18 to 20 days, and the nestlings are in the nest for about 25 (saddleback) to 37 (kokako) days. The fledglings are fed by the parents for at least a few days post-fledge.

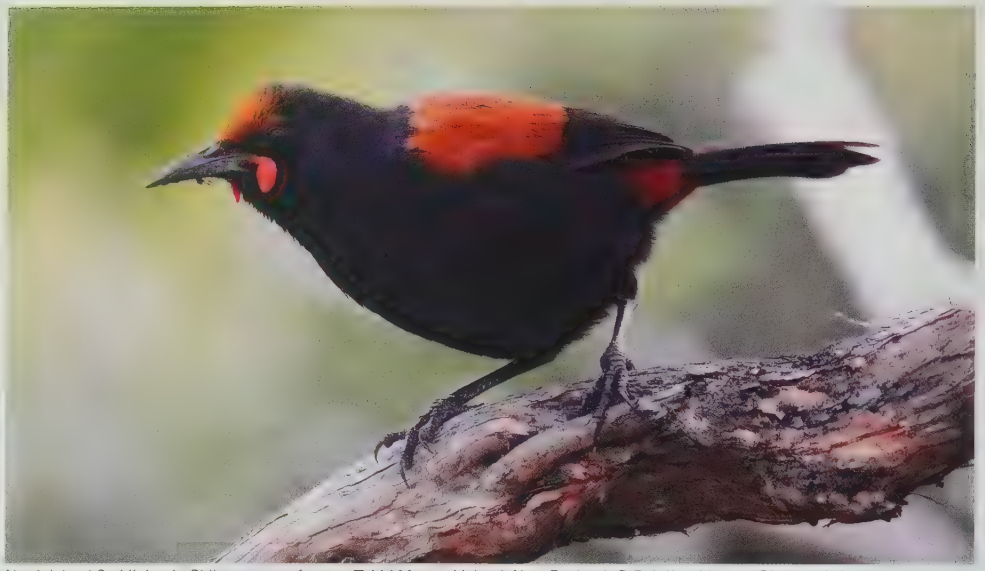
These two captivating New Zealand endemic genera, *Callaeas* and *Philesturnus*, were once common, but now they are found only in areas free of introduced predators. Although both the kokako (*Callaeas*) and the saddlebacks (*Philesturnus*) have wattles at the base of the bill, they are otherwise quite different in appearance and behavior. *Callaeas* recalls a shy, long-legged, short-billed gray crow with leathery wattles of bright shiny blue. The two species of *Philesturnus*, by contrast—one on the South and one on the North Island—are energetic, highly vocal, and glossy black birds reminiscent of starlings or large honeyeaters, and are adorned with red wattles and eponymous reddish-feathered saddles on the back and rump. Both figure prominently in Maori mythology.



North Island Kokako, *Callaeas wilsoni*. Tiritiri Matangi Island, New Zealand. © Simon Fordham / NaturePix.

**Conservation** The Huia *Heteralocha acutirostris*, the sole member of a third genus in this family, was unique in showing dramatic sexual dimorphism in bill morphology: males had short, straight, pointed bills and females long, thin, decurved bills. Huias became extinct in the 20th century as a result of habitat alteration and predation by introduced mammals. Similar pressures, which have caused the extinction of the South Island Kokako *C. cinereus* and the dramatic reduction in ranges and populations of the remaining callaeid species, are the reasons all the remaining species in this family (100%) are at risk (2 NT, 1 EN). The endangered North Island Kokako *C. wilsoni* has been especially hard-hit by predation from introduced Brush-tailed Possum *Trichosurus vulpecula*, which eats eggs, chicks, and incubating adults. The two remaining saddleback species are near threatened because of both introduced mammalian predators and habitat loss from forest fire.

**Relationships** The relationships of Callaeidae have been difficult to determine, and we here treat them as part of the unnatural, informal group that we call the "basal passerid oscines." Callaeidae is likely sister to another New Zealand endemic family, Notiomystidae (Barker *et al.* 2004, Ewen *et al.* 2006, Driskell *et al.* 2007, Shepherd & Lambert 2007). The deeper relationships of the Callaeidae-plus-Notiomystidae clade remain highly uncertain, however, as this old lineage roots deeply within the passerid radiation (Shepherd & Lambert 2007, Irestedt & Ohlson 2008, Aidala *et al.* 2013). The clearest of the recent studies with good taxon sampling indicate that these New Zealand endemics branch deeply in clades that include a number of other families in the Passerida as well as Petroicidae, Picathartidae, and Chaetopidae (Irestedt & Ohlson 2008, Jønsson *et al.* 2011). The latest such study places Callaeidae sister to group that includes Melanocharitidae, Cnemophilidae, Picathartidae, and Petroicidae (Aggerbeck *et al.* 2014). Clearly there are some names in common in the list of most closely related families, but there is yet much to be clarified.



North Island Saddleback, *Philesturnus rufusater*. Tiritiri Matangi Island, New Zealand. © Rob Hutchinson / Birdtour Asia.



North Island Kokako, *Callaeas wilsoni*. Tiritiri Matangi Island, New Zealand. © Rob Hutchinson / Birdtour Asia.

*CALLAEAS*
1 species



*C. wilsoni*
North Island Kokako

*PHILESTURNUS*
2 species



*P. rufusater*
North Island Saddleback

Passeriformes, "Basal Passerid Oscines"

# NOTIOMYSTIDAE
Stitchbird

1 genus • 1 species

**Related Families** Callaeidae (wattled crows), Cnemophilidae (satinbirds), Petroicidae (Australo-Papuan robins)

**Similar Birds** Honeyeaters (Meliphagidae)

**Description**
- Plumage boldly patterned in black, yellow, white, and orange; white tuft behind eye often raised in displays
- Wings and tail medium length
- Body small, ovoid, with hunched posture
- Bill medium length, thin, slightly decurved
- Head medium-sized; neck medium-short, thick
- Legs and feet medium length, thick
- Males more brightly colored and boldly patterned

**Habitat** The Stitchbird is found in broadleaf evergreen forest.

**Food** Stitchbirds feed on nectar, lerps, manna and honeydew, fruits, and invertebrates. The relative proportions of these food items varies with the time of year, but Stitchbirds appear to rely on nectar sources, and will visit artificial feeders over a kilometer apart.

**Breeding** The Stitchbird is most commonly monogamous, but it can also be polygynous, polyandrous, and polygynandrous. Furthermore, it is believed that extra-pair copulations represent a high percentage of matings in this species. During these extra-pair copulations, a male may forcefully copulate with a female face-to-face by holding her down on her back on the ground. Stitchbirds typically build their nests in natural cavities. Within the cavity, the nest consists of a small cup built on a platform of sticks that is constructed of rootlets and fibers from ferns, often being further lined with feathers. Female Stitchbirds lay 2 to 6 eggs, but typically 4 or 5. Only the female constructs the nest and incubates the eggs. However, the male sometimes assists with brooding and provisioning the chicks. Incubation takes 13 to 19 days, and the nestlings leave the nest after about 26 to 32 days post-hatch. Fledglings join a crèche after about a week, and they are fed by their parents for up to two weeks post-fledging.

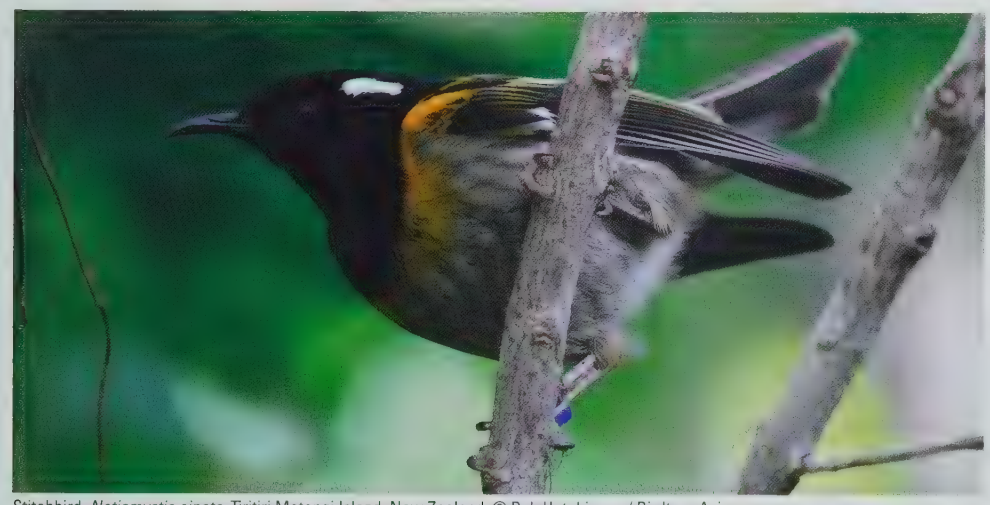


Stitchbird, *Notiomystis cincta*.
Tiritiri Matangi Island, New Zealand. © Simon Fordham / NaturePix.



**Conservation** Although the Stitchbird population is currently stable, it is still quite small, earning it vulnerable status (100%; 1 VU). The small Little Barrier Island, located off the coast of the North Island, is home to the only self-sustaining population of this species. Other populations have been established in areas free of introduced predators on other islands and on the mainland, but these are not yet self-sustaining. There is also a small population in captivity, but it is currently declining. In the near future, conservation efforts will continue to focus on translocating birds to new predator-free sites.

**Relationships** The Stitchbird is part of a miscellaneous group of families with uncertain relationships, some of which are part of a ladderized phylogeny, which we call the "basal passerid oscines." On the basis of morphological traits, the Stitchbird was long assumed to belong in Meliphagidae. Recent molecular phylogenetic investigations, however, have revealed that the Stitchbird is only very distantly related to Meliphagidae. Instead, it represents an old lineage that may be sister to another endemic New Zealand family, Callaeidae (Ewen *et al.* 2006, Driskell *et al.* 2007). Of the three recent studies that have included both Notiomystidae and Callaeidae, two have found them to be sister taxa, in turn sister to Cnemophilidae (Driskell *et al.* 2007) or in a polytomy with other passerid families (Ewen *et al.* 2006). Alternatively, Notiomystidae may be sister to Petroicidae and these, taken together in a polytomy with other corvoid and passeroid groups (Aidala *et al.* 2013, cf. Barker 2014). Clearly, there is much still to be learned about these birds, but their recognition as a separate family seems well justified and likely to encourage further study.



Stitchbird, *Notiomystis cincta*. Tiritiri Matangi Island, New Zealand. © Rob Hutchinson / Birdtour Asia.

The Stitchbird (also known by its native Maori name "Hihi") was once much more widespread in New Zealand, but it is now limited to a few areas of the North Island that are free of introduced predators. This once common little songbird has been brought back from the brink of extinction. Wth a black hood and tufts of white feathers on the sides of its head, it vaguely recalls a honeyeater in appearance, but this morphological similarity belies a mating system and associated sexual behaviors that are unlike those of any other bird. Indeed, recent genetic work confirms that its ancestors have been following a distinct evolutionary trajectory for many millions of years.

*NOTIOMYSTIS*
1 species



*N. cincta*
Stitchbird

# MELANOCHARITIDAE
## Berrypeckers and Longbills

4 genera • 10 species

**Related Families** Callaeidae (New Zealand wattlebirds), Cnemophilidae (satinbirds), Notiomystidae (Stitchbird), Petroicidae (Australasian robins), Picathartidae (rockfowls)

**Similar Birds** Spiderhunters (Nectariniidae), flowerpeckers (Dicaeidae), honeyeaters (Meliphagidae)

**Description**
- Plumage olive, blue-and-gray, or blue-black with pale pectoral tufts; longbills primarily yellow-olive
- Wings medium; tail graduated, short in longbills to long in berrypeckers
- Body small, ovoid to elongate ovoid
- Bill short and very slightly decurved in berrypeckers, long and decurved in longbills
- Head small to medium; neck short, thick
- Legs and feet short to medium
- Male berrypeckers often more boldly patterned than females, except in *Rhamphocharis*

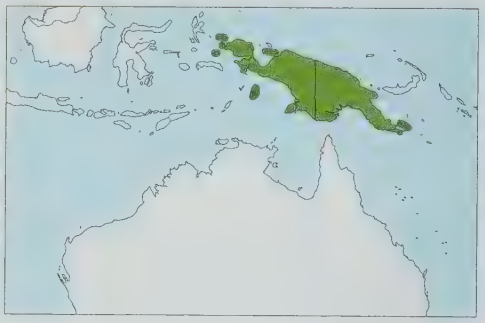
**Habitat** Melanocharitids live in the forests of New Guinea, from the lowlands up to high mountains, and within these habitats, they forage from the understory up to the canopy.

**Food** As their name suggests, berrypeckers feed on a wide variety of fruits, including figs and berries. Insects, predominantly gleaned from leaves and branches, also make up a large part of their diet. By contrast, the longbills are nectarivorous, relying less on fruit than the berrypeckers. However, like the berrypeckers, they also feed heavily on insects and utilize similar methods to forage for them. Most melanocharitids are active foragers, sometimes joining mixed-species flocks as they energetically move through the forest seeking fruit, nectar, and insects.



Fan-tailed Berrypecker, *Melanocharis versteri*. Kumul Lodge, Papua New Guinea. © Con Foley.





**Breeding** The breeding biology of this family is virtually unknown, even though some species in this family are among the most common birds in New Guinea forests. All of the nests that have been described from this family were cup-shaped and attached to a branch. Ferns appear to play an important role in nest construction in berrypeckers, who additionally use lichens to decorate the outside of their nests. Longbills, by contrast, use spiderwebs in the construction of their cup-shaped nests. Limited available data suggest that females lay 1 or 2 eggs. Little is known of the parental care in this group, but it seems that both male and female berrypeckers help in feeding the chicks. There are appar-

Berrypeckers and longbills are generally dull or dark-plumaged birds that haunt the forests of New Guinea, eating insects supplemented by fruits or nectar. Both have bills that, while suited to their dietary preferences, cause them to resemble distinct and unrelated groups of birds. The berrypeckers are like long-tailed flowerpeckers (Dicaeidae) in food preferences and foraging strategies. Longbills, intriguingly, look very much like the Asian spiderhunters (Nectariniidae) that are so common just on the other side of Wallace's Line. There are few families of birds about which so little is known, and further work should clarify whether the ecologies of these birds are as similar to those of the flowerpeckers and spiderhunters as their morphologies would suggest.



Slaty-headed Longbill, *Toxorhamphus poliopterus*. Ambua Lodge, Tari Valley, Papua New Guinea. © Adam Riley / Rockjumper Birding Tours.

ently no quantitative data on developmental periods in this group.

**Conservation** No melanocharitids are of immediate conservation concern, but one species, the Obscure Berrypecker *Melanocharis arfakiana*, is one of the least known birds of New Guinea and is listed as data deficient as a result. Known from only a handful of specimens from widely scattered localities in mid-elevation forests, this tree-top species is quite active and hard to see well, much less definitively identify. It may be common and widespread, but only a concerted effort will determine population sizes and dispel concerns that cloud the identification and conservation of this species.

**Relationships** The berrypeckers were traditionally grouped with the flowerpeckers (Dicaeidae), whereas the longbills were grouped with the honeyeaters (Meliphagidae). Recent molecular phylogenetic studies are consistent, however, in clustering them together (Barker *et al.* 2004, Driskell *et al.* 2007, Shepherd & Lambert 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2011). The broader relationships of Melanocharitidae are uncertain, however, as most studies place them somewhere in the weakly resolved set of lineages we call the "basal passerid oscines" (Barker *et al.* 2004, Driskell *et al.* 2007, Shepherd & Lambert 2007, Irestedt & Ohlson 2008, Jønsson *et al.* 2011). Within this loose group, Melanocharitidae may be sister to a clade that includes Cnemophilidae, Callaeidae, and Notiomystidae (Driskell *et al.* 2007, Barker *et al.* 2004), sister to a clade including Cnemophilidae, Petroicidae, and Picathartidae (Aggerbeck *et al.* 2014), sister to the rest of the passeroids (Irestedt & Ohlson 2008, Barker 2014), or in a polytomy with Cnemophilidae and the rest of the corvoids (Jønsson *et al.* 2011). Clearly, we have much to learn still about this group, and we have tried to craft a most reasonably limited list of related families for the melanocharitids.



Fan-tailed Berrypecker, *Melanocharis versteri*. Satop, Huon Peninsula, Papua New Guinea. © Lars Petersson.

*MELANOCHARIS*
5 species



*M. nigra*
Black Berrypecker

*RHAMPHOCHARIS*
1 species



*R. crassirostris*
Spotted Berrypecker

*OEDISTOMA*
2 species



*O. iliolophus*
Dwarf Longbill

*TOXORHAMPHUS*
2 species



*T. novaeguineae*
Yellow-bellied Longbill

# CNEMOPHILIDAE
## Satinbirds

2 genera • 3 species

**Related Families** Callaeidae (New Zealand wattlebirds), Notiomystidae (Stitchbird), Petroicidae (Australasian robins), Picathartidae (rockfowls)

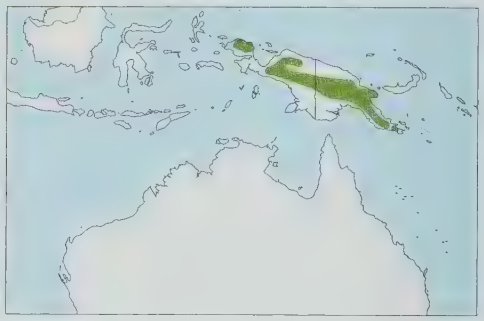
**Similar Birds** Birds-of-paradise (Paradisaeidae), bowerbirds (Ptilonorhynchidae), cotingas (Cotingidae)

**Description**
- Plumage glossy black with orange, or brown with yellow or olive
- Wings short, rounded; tail medium length, graduated
- Body medium-sized, ovoid, with hunched posture
- Bill short to medium, straight, slightly hooked, with broad gape
- Head medium-large; neck extremely short, thick
- Legs short; feet small
- Males larger, more colorful, and more boldly pattered, with yellow domed wattles atop bill in *Loboparadisea*



Crested Satinbird, *Cnemophilus macgregorii*. Kumul Lodge, Papua New Guinea. © Nik Borrow.





**Habitat** All three satinbird species are found in montane forests, including edge, second growth, and disturbed forest.

**Food** The satinbirds are primarily frugivorous, feeding mainly on "simple" fruits and berries, sometimes supplemented with small numbers of invertebrates. Satinbird nestlings are fed fruits almost exclusively.

**Breeding** Little is known of the breeding biology of the satinbirds, though they appear to be polygynous with female-only parental care. Males display from traditional perches, but little is known of their courtship displays. The *Cnemophilus* satinbirds build globular, domed nests less than 4 m from the ground; the globe, mostly of moss, is built with a broad ovate entrance hole and sits upon a foundation of sticks. Nests are lined with the stems of epiphytic orchids. In *Loboparadisea* the nest is an open cup but of similar construction. A single-egged clutch is laid. Incubation takes at least 19 days and maybe about 25 days, and the nestling period appears to be more than 30 days. No other information is available.

**Conservation** Only one satinbird (33%) is of conservation concern (1 NT). The Yellow-breasted Satinbird *Loboparadisea sericea* has a widely scattered distribution and seems to be absent from many areas of apparently suitable habitat. The risks associated with such a fragmented distribution may be compounded by mining and logging activities.

**Relationships** The satinbirds are a group of three species that have traditionally been treated as birds-of-paradise (Paradisaeidae). Recent molecular phylogenetic studies have instead strongly indicated that the satinbirds represent an old lineage quite distant from Paradisaeidae, either closer to the root of the corvoids (Cracraft & Feinstein 2000, Jønsson *et al.* 2011) and sister to Callaeidae (and Notiomystidae) (Barker *et al.* 2004, Driskell *et al.* 2007) or closer to the root of the Passerida (Irestedt & Ohlson 2008) with a sister relationship to a clade that includes Petroicidae and Picathartidae (Aggerbeck *et al.* 2014). Few families better illustrate the uncertain affinities of these "basal passerid oscines," and further work seems likely to clarify these relationships.

The three species in this family, found only in New Guinea, were long thought to be birds-of-paradise. However, recent molecular evidence suggests that they do not share particularly close affinities with this group, so they are now placed in a family of their own. Close examination of the satinbirds reveals distinctive morphological characteristics that separate them from the birds-of-paradise, including broad gapes, relatively short bills, and an unusual unossified region around the nostrils. Although their nests have been described, much of the breeding biology of these chunky birds, along with many other aspects of their life histories, remains unknown.



Crested Satinbird, *Cnemophilus macgregorii*. Kumul Lodge, Papua New Guinea. © Nick Athanas.

*CNEMOPHILUS*
2 species



*C. loriae*
Loria's Satinbird

*LOBOPARADISEA*
1 species



*L. sericea*
Yellow-breasted Satinbird

Passeriformes, "Basal Passerid Oscines"

# PICATHARTIDAE
Rockfowls

1 genus • 2 species

**Related Families** Chaetopidae (rockjumpers), Eupetidae (Rail-babbler)

**Similar Birds** Rail-babbler (Eupetidae), crows (Corvidae), guans (Cracidae)

**Description**
- Plumage smooth, silky; black or olive above, white or yellow cream below; black wings
- Wings medium length; tail long, rounded
- Body medium-large, elongate cylindrical ovoid
- Bill medium-long and stout
- Head small, mostly covered with brightly colored bare skin, with large eyes; neck long and slender
- Legs long; feet medium and stout
- Sexes similar

**Habitat** Rockfowls inhabit lowland and mid-elevation rainforests where they can find either caves or sheltered cliffs for nest sites and slow streams with muddy banks for nesting material. Picathartids are most frequent in forest patches with dense leaf litter and army ants, and they can tolerate disturbed forest and second-growth.

**Food** Picathartids feed primarily on insects and other invertebrates, such as earthworms and crabs, as well as small vertebrates, including fish, lizards, and frogs. They forage on the ground, and even in streams, but are also not averse to foraging high in trees. They quite often follow army ant swarms, capturing prey that are struggling to escape.

**Breeding** Picathartids are monogamous with biparental care. They sometimes breed colonially, with up to 40 pairs at a single site if nest sites elsewhere are limited. More frequently, only one or two nests are located at a single site. The nests are mud cups that are reinforced with leaves, twigs, and grass incorporated into the mud and lined with dry vegetation; these are attached to vertical rock wall surfaces on cliffs or in caves. Females lay 1 to 3 eggs, although 2 is the most common clutch size. Both males and females are active in incubation and in feeding the chicks. Incubation takes 17 to 28 days, with 20 days being most common, and the nestlings leave the nest at 23 to 29 days post-hatch.



White-necked Rockfowl, *Picathartes gymnocephalus*. Bonkro, Ghana. © Adam Riley / Rockjumper Birding Tours.



**Conservation** Both White-necked and Gray-necked Rockfowl (*Picathartes gymnocephalus* and *P. oreas*, respectively) are of conservation concern (2 VU). Populations have declined in recent years as a result of continuing habitat fragmentation due to forest clearing for agriculture, timber, and charcoal production. The highly scattered and sparse distributions of both species suggest small population sizes with limited capacity to absorb further habitat modification.

**Relationships** The rockfowls form part of a small clade of loosely allied oscine passerines we call the "basal passerid oscines." They were previously grouped with highly divergent families including Corvidae, Timaliidae *sensu lato*, and Sylviidae *sensu lato*, but recent molecular phylogenetic studies have shown that the rockfowls are only distantly related to these other groups, and at least two studies suggest that Picathartidae is sister to all the other Passerida, either including Petroicidae (Barker *et al.* 2004, Beresford *et al.* 2005) or not (Irestedt & Ohlson 2008, Barker 2014). Another study concentrating on the corvoids indicates that Picathartidae is sister to a clade that includes Petroicidae and other Passerida (Aggerbeck *et al.* 2014). Still, it must be remembered that these "basal passerid oscines" do not necessarily have very much stronger relationships to Passerida than they do to Corvoidea, as one study suggests that Picathartidae is sister to the corvoids (Shepherd & Lambert 2007). The relatively few studies that have included Chaetopidae, Eupetidae, and Picathartidae indicate that Picathartidae is sister to the clade made up of Eupetidae and Chaetopidae together (Jønsson *et al.* 2007, Jønsson *et al.* 2011), and other studies lacking Eupetidae indicate a sister relationship for Picathartidae with Chaetopidae (Beresford *et al.* 2005, Irestedt & Ohlson 2008).



White-necked Rockfowl, *Picathartes gymnocephalus*. Bonkro, Ghana. © Adam Riley / Rockjumper Birding Tours.

In the forests of western Africa live two species of large songbirds, whose long-necked, long-tailed, and long-legged profiles hint at their affinities to the equally enigmatic Rail-babbler, a continent away. Unlike their relative, however, these birds sport naked heads decorated with large colorful patches. Their English common name derives from their predilection for building their nests high on a cave or cliff wall. Asymmetric sexual selection is apparently not the cause of their bizarre appearance, as the sexes are similar and the pair dutifully raise their one to three chicks together. Rockfowl use their long legs to bound and hop along the forest floor, turning over leaves in search of prey, and at times leaping upwards to grab insects from overhanging vegetation.

*PICATHARTES*
2 species



*P. oreas*
Gray-necked Picathartes

# EUPETIDAE
## Rail-babbler

1 genus • 1 species

**Related Families** Chaetopidae (rockjumpers), Picathartidae (rockfowls)

**Similar Birds** Jewel-babblers (Cinclosomatidae), mesites (Mesitornithidae), rockfowls (Picathartidae)

**Description**
- Plumage mostly olive-brown with black mask, white eye-stripe, and rich reddish-brown crown
- Wings short, rounded; tail long, graduated
- Body medium-small, elongate ovoid with horizontal carriage
- Bill medium-long, straight, thin
- Head small; neck long, thin
- Legs long, delicate; toes short, delicate
- Sexes similar

**Habitat** Rail-babblers live in mature forest with a relatively open understory. Their habitat occurs primarily from sea level to mid-elevations, and they only rarely live in montane forests.

**Food** Eupetids feed mainly on insects and other arthropods, including beetles, spiders, and cicadas. They forage by walking, and often running, over the ground and turning over leaves and fallen branches.

**Breeding** Very little is known of the breeding biology of the Rail-babbler, owing in large part to its shy and secretive nature. Only a single nest and clutch have been described, with no description of behavior of adults at the nest. The nest consisted of a loose, open cup built of plant material resting on dead leaves and stalks about 30 cm above the ground. Clutch size was 2 eggs. Nothing was reported of parental care or chick growth.

**Conservation** The populations of this elusive songbird are extremely difficult to assess, but the scattered distribution of known localities for the species and what appear to be small populations at many of them, together with the ongoing pressure on south Asian forest habitats, justify watchful conservation concern (100%; 1 NT).



Rail-babbler, *Eupetes macrocerus*.
Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

**Relationships** Eupetidae is part of a small clade of oscine passerines within a group we call the "basal passerid oscines." The relationships of the Rail-babbler were long mysterious, with proposed affinities to Timaliidae *sensu lato*, Cinclosomatidae, or Psophodidae. Molecular phylogenetic evidence indicates that Eupetidae is not at all closely related to any of these groups, but instead is likely sister to Chaetopidae, and these two as a clade are likely sister to Picathartidae and Chaetopidae (Jønsson *et al.* 2007, Jønsson *et al.* 2011). The larger relationships of Eupetidae have not been studied explicitly, but those relationships are best indicated by the relationships of the better-studied Picathartidae.



The sole member of this family is a retiring and elusive denizen of mature forests in southern Asia. Many people who have spent a great deal of time in this species' habitat still dream of glimpsing this elegant bird, with its distinctive long-legged, small-headed profile, walking sedately into a gap in the jungle green. The Rail-babbler often announces its presence by a simple long whistled call, delivered by bowing its neck near the ground and inflating paired blue-purple air sacs on either side of the neck. That call is so similar to the calls of some pittas sharing the forests that hopeful observers cannot even be sure they are hearing this most mysterious resident.



Rail-babbler, *Eupetes macrocerus*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

*EUPETES*
1 species



*E. macrocerus*
Rail-babbler

Passeriformes, "Basal Passerid Oscines"

# CHAETOPIDAE
## Rockjumpers

1 genus • 2 species

**Related Families** Eupetidae (Rail-babbler), Picathartidae (rockfowls)

**Similar Birds** Grassbirds (Locustellidae), thrashers (Mimidae), thrushes (Turdidae)

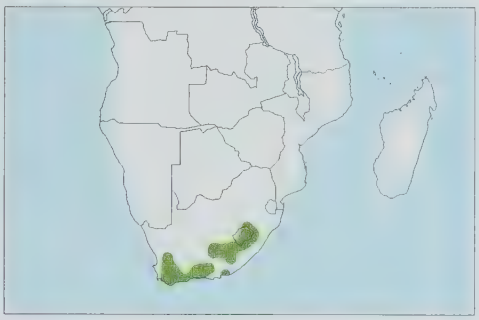
**Description**
- Plumage boldly patterned in streaky gray above, with white stripes and spots and patches of black, rufous, and cinnamon below
- Wings medium-short, rounded; tail long, rounded, graduated
- Body medium-sized, cylindrical ovoid
- Bill medium length, thin, very slightly decurved
- Head medium-sized with bright red eye; neck medium-short, thick
- Legs and feet medium length, stout
- Males more brightly colored; female plumage mostly brown

**Habitat** Rockjumpers are denizens of steep grassy slopes that have extensive rock outcroppings.



Drakensberg Rockjumper, *Chaetops aurantius*. Sani Pass, KwaZulu-Natal, South Africa. © Adam Riley / Rockjumper Birding Tours.





**Food** Rockjumpers feed primarily on insects and other invertebrates, but also take small vertebrates such as lizards and frogs. Rockjumpers forage by probing in the ground and at the sandy bases of rocks for their prey.

**Breeding** Rockjumpers are monogamous with biparental care and cooperative breeding, with family groups as large as 12 individuals. Nests of rockjumpers are bulky cups built mostly of grass and twigs and lined with finer material, including rootlets, fur, lichen, and moss. Nests are often placed low above the ground near the base of a large rock or shrub or in a grass clump. Females typically lay 2 or 3 eggs. Both male and female contribute to nest-building, incubation, and feeding nestlings. In cooperative breeding groups, helpers also contribute to incubation and feeding nestlings. Incubation takes 19 to 21 days and the chicks are in the nest for 18 to 21 days, leaving the nest by foot and able to fly about a week to ten days later. Fledglings are fed by parents and helpers for up to a month after they leave the nest.

**Conservation** Rockjumpers face no immediate conservation concerns.

**Relationships** Rockjumpers are part of a small group of loosely allied oscine passerines we informally call the "basal passerid oscines." Although they were previously often placed with Timaliidae, molecular phylogenetic studies have shown that Chaetopidae instead is allied with Picathartidae (Beresford *et al.* 2005, Irestedt & Ohlson 2008) and Eupetidae. The only studies that have included all three taxa indicate that Picathartidae is sister to the clade made up of Eupetidae and Chaetopidae together (Jønsson *et al.* 2007, Jønsson *et al.* 2011). The broader relationships of this clade of three are best indicated by reference to the relationships of the better-studied Picathartidae. The official description of this family by Fjeldså and colleagues appears in this volume on page 33.

These mid-sized passerines of high rocky outcrops in southern Africa do indeed scurry and bound among the rocks and surrounding turf searching for their small animal prey. On grass, they move with tail down and the run-and-stop cadence of a thrush or plover, but on rocks they run and jump with abandon, holding their long tails up above their back as counterweight to their springing bodies. Remnants of an ancient split among passerines, rockjumpers bear little resemblance to their closest relatives, which reside far away in the forests of southern Asia and western Africa.



Drakensberg Rockjumper, *Chaetops aurantius*. Sani Pass, KwaZulu-Natal, South Africa. © Adam Riley / Rockjumper Birding Tours.

*CHAETOPS*
2 species



*C. frenatus*
Cape Rockjumper

# PETROICIDAE
## Australasian Robins

20 genera • 46 species

**Related Families** Picathartidae (rockfowls), Chaetopidae (rockhoppers), Eupetidae (Rail-babbler), Notiomystidae (Stitchbird), Callaeidae (New Zealand wattlebirds), and perhaps 60 other families of passeroid birds

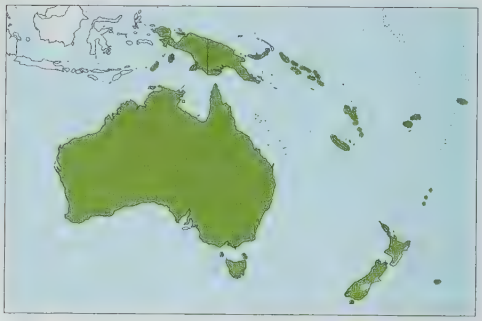
**Similar Birds** Robins and chats (Muscicapidae)

**Description**
- Plumage generally brown, olive, or black above and pale brown, white, yellow, red, or pink below, often with black hood, cap, mask, or other facial pattern
- Wings short to medium; tail short to long
- Body small, ovoid, with upright posture in most
- Bill short to medium, generally thin
- Head medium to large, rounded; neck short
- Legs and feet of medium length and thickness
- In *Petroica* and a few other genera, males generally more brightly colored and boldly patterned than females



Scarlet Robin, *Petroica boodang*.
Oyster Cove, Tasmania, Australia. © G. B. Baker.





These upright-postured insectivores of Australasia frequent forests and forest edges. With their compact shapes, large round heads, and plumages of grays, browns, and blacks above contrasting with yellow, red, or even pink on the underparts, many Australasian robins recall their European namesake. Generally quiet birds, they sit and wait, often from a low perch only a meter or two above the forest floor, for passing insect prey. This group includes the ground- and scrub-robins, birds more terrestrial than the rest, and the latter distinctive for the long tails that they cock over their backs.

**Habitat** Australasian robins live in a variety of wooded habitats, from dense tropical rainforest to open arid woodland and desert scrub and from sea level to high mountains. Some species, especially those in Australia, live in edge habitats near fields and grasslands.

**Food** Petroicids are primarily insectivorous, though some species take substantial numbers of crabs and even small vertebrates, and others a good deal of fruit. Most species in the family pounce on their insect prey on the ground from a low open perch. But even the pouncing species will capture flying insects by sallying from a perch or by fluttering up to glean them from surrounding vegetation. The scrub- and ground-robins take all or most of their prey while foraging on the ground, grabbing visible prey or turning over leaves to search for them.

**Breeding** All members of this family are monogamous with biparental care. Australasian robins maintain long-term pair bonds, and some species are cooperative breeders. Species that breed cooperatively usually have only one or two helpers at the nest. Nest shape is variable. Some (*Microeca*) are flat and very small saucer-shaped nests of grass and rootlets bound with spiderwebs. Most are open cups built of small twigs, rootlets, and vine tendrils, held together with cobwebs and decorated with moss and lichens, which sometimes hang from the bottom of the nest. Most species place their nests in a fork or on a branch, but the ground- and scrub-robins place their large bowl-shaped nests of sticks on the ground against a rock or tree trunk, and a few species nest in tree cavities. Female petroicids generally lay 1 to 3 eggs, although clutches of up to 6 have been recorded in some species. Except in the scrub-robins, where males take a more equal role in parental care, only the female builds the nest and incubates the eggs, although the male will feed her while she is incubating. Both sexes provision the young. In cooperative breeders,



Tomtit, *Petroica macrocephala*. Auckland Islands, New Zealand. © G. B. Baker.

helpers also feed the female during nest construction and incubation, as well as provision the young. Incubation takes 14 to 20 days; the young leave the nest after 12 to 22 days and they are fed for some time after.

**Conservation** Petroicids are generally faring quite well, though four species (9%) are at risk (3 NT, 1 EN). The endangered Black Robin *Petroica traversi* is endemic to the Chatham Islands off of New Zealand. Having declined to a total of only five individuals in 1980, intense management has brought its population up to nearly 250 individuals, giving conservationists hope for its future. Of the three near-threatened species, the Tanimbar Flyrobin *Microeca hemixantha* is a restricted-range endemic to two small islands; the Olive-yellow Robin *Poecilodryas placens* is widespread but very patchy in its occurrence in hill forest in New Guinea. The near-threatened Flame Robin *P. phoenicea* is perhaps the most mysterious of the three. Most of its habitat seems relatively intact, but its populations have declined sharply since 1980, and the most likely reason for the decline seems to be rising environmental temperatures. And finally, the data-deficient Snow Mountain Robin *P. archboldi* is known from only two disjunct mountains in New Guinea, and it is not clear whether the paucity of recent reports reflects the difficulty of getting to these sites or population declines caused by mining activities.

**Relationships** Petroicidae is part of the group of loosely allied oscine passerines that we informally call the "basal passerid oscines," which together are likely sister to the large and diverse Passerida (Barker *et al.* 2004, Jønsson *et al.* 2007, Irestedt & Ohlson 2008, Norman *et al.* 2009, Aggerbeck *et al.* 2014, Barker 2014). The Australasian robins were long thought to be allied with Muscicapidae, though molecular phylogenetic studies have suggested instead that they may be sister to the rest of Passerida (Barker *et al.* 2004, Beresford *et al.* 2005, Shepherd & Lambert 2007, Jønsson *et al.* 2011, Aggerbeck *et al.* 2014), sister to Eupetidae, Picathartidae, and Chaetopidae together (Jønsson *et al.* 2007), or sister to Notiomystidae, and presumably its sister family, Callaeidae (Barker 2014).



White-faced Robin, *Tregellasia leucops*. Iron Range NP, Cape York, Queensland, Australia. © Drew Fulton.

Subfamily **AMALOCICHLINAE**

*AMALOCICHLA*
2 species



*A. sclateriana*
Greater Ground-robin

Subfamily **PACHYCEPHALOPSINAE**

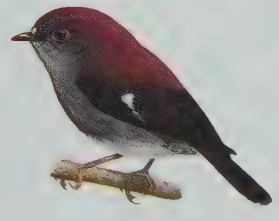
*PACHYCEPHALOPSIS*
2 species



*P. hattamensis*
Green-backed Robin

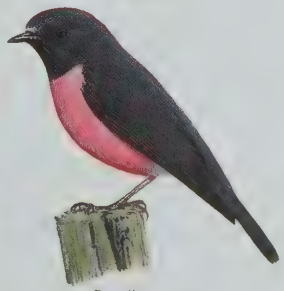
Subfamily **PETROICINAE**

*EUGERYGONE*
1 species



*E. rubra*
Garnet Robin

*PETROICA*
11 species



*P. rodinogaster*
Pink Robin

## Subfamily MICROECINAE

*KEMPIELLA*
2 species



*K. griseoceps*
Yellow-legged Flyrobin

*DEVIOECA*
1 species



*D. papuana*
Canary Flyrobin

*CRYPTOMICROECA*
1 species



*C. flaviventris*
Yellow-bellied Robin

*MONACHELLA*
1 species



*M. muelleriana*
Torrent Flyrobin

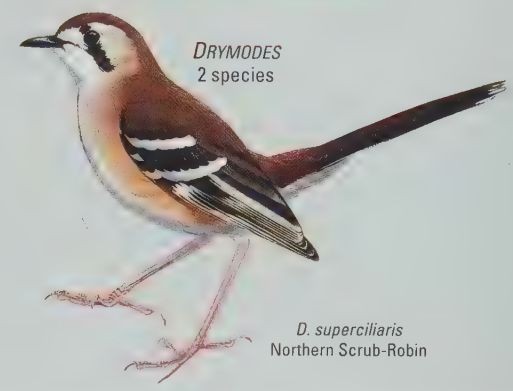
*MICROECA*
3 species



*M. hemixantha*
Tanimbar Flyrobin

## Subfamily DRYMODINAE

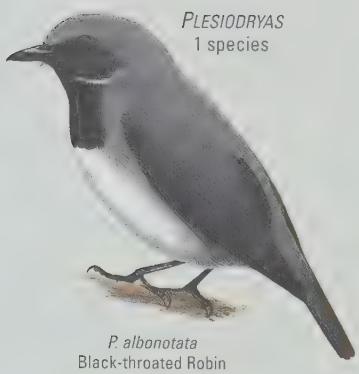
*DRYMODES*
2 species



*D. superciliaris*
Northern Scrub-Robin

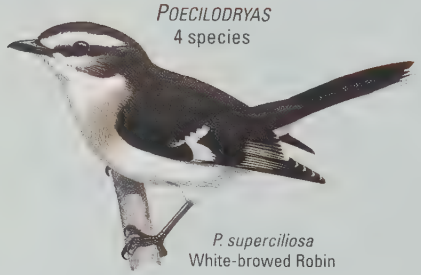
## Subfamily EOPSALTRIINAE

*PLESIODRYAS*
1 species



*P. albonotata*
Black-throated Robin

*POECILODRYAS*
4 species



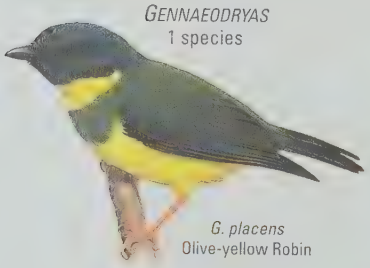
*P. superciliosa*
White-browed Robin

*HETEROMYIAS*
2 species



*H. albispecularis*
Ashy Robin

*GENNAEODRYAS*
1 species



*G. placens*
Olive-yellow Robin

*EOPSALTRIA*
2 species



*E. australis*
Eastern Yellow Robin

*QUOYORNIS*
1 species



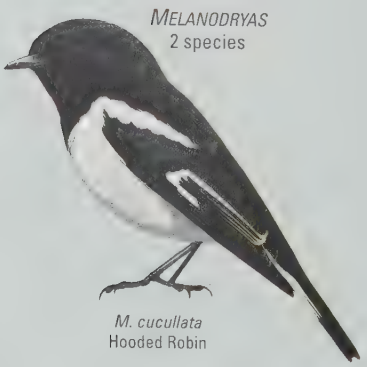
*Q. georgiana*
White-breasted Robin

*TREGELLASIA*
2 species



*T. leucops*
White-faced Robin

*MELANODRYAS*
2 species



*M. cucullata*
Hooded Robin

*PENEOTHELLO*
4 species



*P. bimaculata*
White-rumped Robin

*PENEOENANTHE*
1 species



*P. pulverulenta*
Mangrove Robin

# Order: Passeriformes, Sylvioid Oscines

**Families:** Hyliotidae, Stenostiridae, Paridae, Remizidae, Alaudidae, Panuridae, Nicatoridae, Macrosphenidae, Cisticolidae, Acrocephalidae, Pnoepygidae, Locustellidae, Donacobiidae, Bernieridae, Hirundinidae, Pycnonotidae, Phylloscopidae, Scotocercidae, Aegithalidae, Sylviidae, Zosteropidae, Timaliidae, Pellorneidae, Leiothricidae

Sylvioidea is one of the three very large groups of oscines, and it is heavily represented by mainly Old World families. Note that there is not much consistency in the usage of group names in this large assemblage. We try to make our meaning clear by listing above the families we include, and our usage of "Sylvioidea" is very similar to that of Alström *et al.* (2013a). Cracraft (2014) provides a more fine-grain organization, treating what we call Sylvioidea as Parvorder Sylviida, with the following superfamilies within five well-supported clades: Paroidea (Paridae, Remizidae, Stenostiridae), Alaudoidea (Alaudidae, Panuridae), Locustelloidea (Bernieridae, Donocobiidae, Locustellidae), Aegithaloidea (Phylloscopidae, Aegithalidae, Scotocercidae), and a restricted Sylvioidea for just the babblers and Sylviidae (Cracraft 2014). No matter how we define or divide this group, it has historically caused many problems for taxonomists, due in large part to the lack of diagnosable morphological characters by which to group species. Traditionally (Sibley & Ahlquist 1990), this large superfamily had largely been defined by two families, the Old World warblers (Sylviidae *sensu lato*) and the babblers (Timaliidae *sensu lato*). However, molecular analyses have revealed clades with distinctive histories and characteristics within both these larger families, clades that merit recognition as separate groups. What were once "Old World warblers" now are scattered among eight different families, and the "Old World babblers" are now found in five different families, one of which is not even in this group (Alström *et al.* 2006, Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a, Alström *et al.* 2014).



Black-headed Bulbul, *Brachypodius atriceps*.
Serinsim Substation, Kinabalu NP, Sabah, Borneo. © Teresa Pegan.



White-browed Tit-warbler, *Leptopoecile sophiae*.
Kandashan Pass, Qinghai, China. © Dubi Shapiro.



Ashy Prinia, *Prinia socialis*. Outskirts of Bangalore, India. © Arun Kumar N. K.

# HYLIOTIDAE
## Hyliotas

1 genus • 4 species

**Related Families** Stenostiridae (fairy flycatchers), Paridae (tits and chickadees), Remizidae (penduline-tits)

**Similar Birds** Trillers (Campephagidae), bou-bou shrikes (Malaconotidae), batises and wattle-eyes (Platysteiridae)

**Description**
- Plumage dark glossy black above, yellow-buff below, most species with distinct white wing bar
- Wings medium-long; tail short
- Body small, cylindrical ovoid, with horizontal posture
- Bill medium length and thickness, straight
- Head medium-sized; neck short, thick
- Females duller than males and with back generally dull brown rather than glossy black

**Habitat** Hyliotas are found in acacia woodland, savanna, and some more-open human-altered habitats, including coffee plantations.

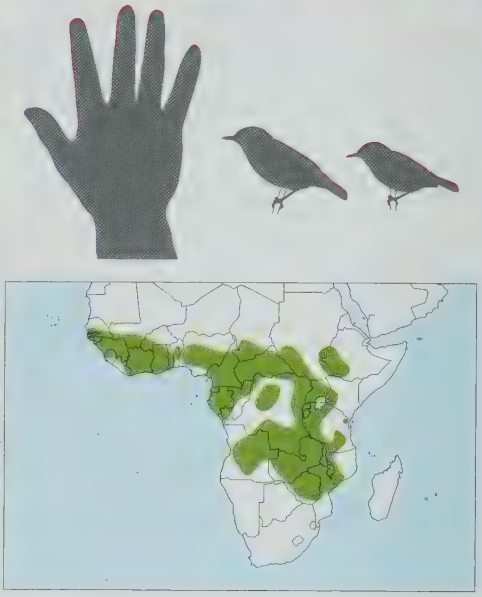
**Food** Hyliotas feed on insects, including insect eggs. They forage actively alone, in pairs, or in small groups, often in mixed-species flocks, in low shrubs but perhaps most often high in treetops, and especially in flowering or fruiting trees. They prefer smaller branches and hop along them, gleaning from bark and foliage; they often hang upside-down to search beneath leaves and branches, and they also take prey in flight.

**Breeding** Very little information is available on the breeding biology of the hyliotas, although they appear to be monogamous with biparental care. Nests consist of simple, round cups of plant stems, rootlets, moss, lichens, and other material, often placed high in a tree in the fork of a branch. Females typically lay 2 to 4 eggs. No information is available on chick growth or incubation and nestling periods.

**Conservation** Although most hyliotas face no immediate conservation concerns, one restricted-range species (25%) is of concern (1 EN). The endangered Usambara Hyliota *Hyliota usambara* is found in very small fragments of foothill forest in northeastern Tanzania where it is threatened by habitat destruction.



Southern Hyliota, *Hyliota australis*.
Sango, Zimbabwe. © Adam Riley / Rockjumper Birding Tours.



**Relationships** Hyliotas are oscine passerines, here recognized as part of the superfamily Sylvioidea. Few recent phylogenetic studies have included the hyliotas, but the available evidence suggests that they do not belong with the traditional Sylviidae *sensu lato*, where they had usually been placed. Though the exact placement of Hyliotidae is still not quite settled, all recent studies indicate that it is an old lineage that split off near the base of the radiation of Sylvioidea. The analyses of Fuchs *et al.* (2006b, 2009) indicate it is a distinct lineage in a polytomy with all the other major clades of the Passerida, and Johansson *et al.* (2008b) found it to be in a polytomy with all the Passerida except the passeroids. Alström *et al.* (2014) found Hyliotidae in a polytomy with Stenostiridae and a clade made up of Paridae and Remizidae, with these four taxa taken together sister to the rest of the sylvioids, and Barker (2014) found it sister to Paridae, and together these were sister to all the other sylvioids. In choosing related families here, we have been influenced by these latest studies finding closer sister relationships with a few families, but it should remain clear that this is an old group with distant affinities to a great number of passerine groups.



Violet-backed Hyliota, *Hyliota violacea*. Kakum NP, Ghana. © Adam Riley / Rockjumper Birding Tours.

These small passerines move through the canopy of African trees as they forage, gleaning their prey energetically with constantly moving head and eyes, but jumping and bounding between branches more than the warblers that they often forage alongside. All are glossy shades of blue-black above with light-colored bellies. Their tails look a little small relative to their horizontally-held bodies, distinguishing them from the heavier framed and more upright-postured shrikes and batises whose coloration and habitats they share.

*HYLIOTA*
4 species



*H. australis*
Southern Hyliota

Passeriformes, Sylvioid Oscines

# STENOSTIRIDAE
## Fairy Flycatchers

4 genera • 9 species

**Related Families** Paridae (tits and chickadees), Remizidae (penduline-tits)

**Similar Birds** Batises (Platysteiridae), fantails (Rhipiduridae), Australian robins (Petroicidae), Old World flycatchers (Muscicapidae)

**Description**
- Plumage with large patches of blue, gray, white, or yellow, sometimes with black patterning
- Wings medium length; tail medium to long, held cocked over the back in some species
- Body very small, cylindrical ovoid, compact
- Bill short to medium, straight, thin, and broad
- Head small to medium, with crest in some species; neck short, thick
- Legs and feet short, thin
- Sexes similar

**Habitat** Stenostirids live primarily in tropical and temperate evergreen forests, although some occur in scrub habitat.

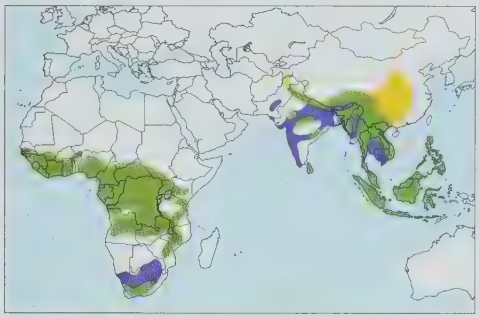
**Food** The stenostirids appear to eat only insects and other small invertebrates, ranging from gnats to moths, bees, and spiders, no longer than about 30 mm in size. Prey are captured either by gleaning from leaves and branches or by sallying out to catch them in mid-air. In vegetation, they often droop and fan their wings and tail while foraging, and they sometimes join mixed-species flocks.

**Breeding** Most species in this family whose breeding strategies are known are monogamous, some even potentially pairing for life. However, one species, the Blue Crested Fairy-flycatcher *Elminia longicauda*, breeds cooperatively on occasion, retaining helpers to assist in raising the chicks. All stenostirids appear to build an open, cup-shaped nest, although the composition of this nest varies, in part due to the availability of different materials. All tend to use some plant down in the construction of the nest, and most will use cobwebs and fine hair as binding. Females lay 1 to 4 eggs, with 2 eggs being most common. Depending on the species, the nest is apparently built either by the male or by the female. The female alone incubates, sometimes fed and guarded by the male, and incubation takes 15 to 18 days. It appears that both sexes (and helpers if present) provision



Gray-headed Canary-flycatcher, *Culicicapa ceylonensis*. Muthorai, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.





This newly recognized family unites members of several different flycatching groups. All are dainty, small-bodied insectivores of wooded areas of Asia and Africa, their delicate legs and toes supporting relatively small-billed and long-tailed birds. Stenostirids are active insectivores that move with quick movements—flitting rapidly to and from their foraging perches, sallying out to snag a flying insect, or darting to grab prey on nearby vegetation, often with frenetic wing-shakes and stretches while perched. Despite their activity, these tiny bundles of insect-eating energy are easily overlooked, and there is very little known about their biology.



Fairy-fantail, *Chelidorhynx hypoxanthus*. Sattal, Uttarakhand, India. © Varun HB.

the chicks. Nestlings leave the nest after 12 to 14 or more days, and the fledglings are fed after fledging for about three weeks.

**Conservation** There are no immediate conservation concerns for any of the Stenostiridae.

**Relationships** Stenostiridae is a family of oscine passerines here placed with Sylvioidea. Until recently, many members of Stenostiridae were thought to be more distantly related to one another, being split among Muscicapidae, Monarchidae, and Rhipiduridae. Recent molecular phylogenetic studies have shown, however, that the various genera now placed in Stenostiridae are very distant from these former placements and are more closely related to each other than to any others, apparently having diverged early in the sylvioid radiation (Pasquet *et al.* 2002, Barker *et al.* 2004, Beresford *et al.* 2005, Johansson *et al.* 2008b, Fuchs *et al.* 2009, Alström *et al.* 2013a, Alström *et al.* 2014). Though many studies do not include sufficient taxonomic sampling or have sufficiently well supported results to make a judgment about sister groups, those that do indicate that Stenostiridae may be sister to a clade made up of Paridae and Remizidae (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2014).



African Fairy-flycatcher, *Stenostira scita*. Sani Pass, KwaZulu-Natal, South Africa. © Francesco Veronesi.



Passeriformes, Sylvioid Oscines

# PARIDAE
## Tits and Chickadees

14 genera • 57 species

**Related Families** Remizidae (penduline-tits), Stenostiridae (fairy flycatchers), Hyliotidae (hyliotas)

**Similar Birds** Bushtits (Aegithalidae), penduline-tits (Remizidae), yuhinas (Zosteropidae)

**Description**
- Plumage often boldly patterned; black, white, and gray dominant, some species with the addition of yellow, blue, or brown
- Wings rounded; tail medium to medium-long
- Body small, ovoid, compact
- Bill short, stout, sharp
- Head small to large, some with crest; neck short, thick
- Legs and feet short, stout
- Sexes similar

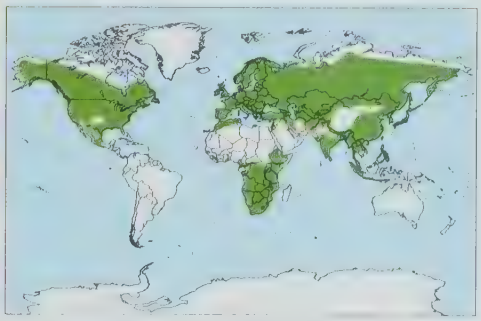
**Habitat** Most tits live in forested habitats, from boreal coniferous forests in the north to humid tropical forests in the south, but a small number occupy desert scrub and other arid habitats. Wherever they live, they require the presence of cavities to nest in; however, some will use holes in the ground.

**Food** All tits feed on insects, and those in colder regions will readily switch from insects to seeds, buds, and fruit when insects are scarce. During the autumn, tits and chickadees that experience cold, harsh winters often hoard food for consumption later in the winter. When dealing with a large seed, a tit usually holds it with one foot and hammers it with its bill until it has accessed the rich seed inside. In years when many large seeds are eaten, this repeated hammering produces growth adjustments in the bill that make it thicker and a better nutcracker.



Varied Tit, *Sittiparus varius*.
Yuwandake, Amami Oshima, Kagoshima, Japan. © Ian Davies.





**Breeding** Tits and chickadees are generally monogamous, with cooperative breeding in some *Baeolophus* species, in the African *Parus* species, and in *Pseudopodoces*. All nest in cavities, and almost exclusively in trees. Many use only cavities excavated by other birds (e.g., woodpeckers), although some will excavate their own cavities if the tree is already softened by decay. At least some parid species (White-browed Tit *Poecile superciliosus* and Ground Tit *Pseudopodoces humilis*) nest in abandoned rodent burrows. Most tits and chickadees line the inside of the cavity with moss and hair. Parids lay 2 to 13 eggs, with those in the northern latitudes laying many more than those in the tropics. Large clutches

These familiar birds of Northern Hemisphere forest habitats have somewhat stouter bills and eat more seeds during the harsh winter months than do many other small passerine birds that resemble them. They reach their highest diversity in the Himalayas, where species display the entire array of crests, masks, bibs, and colors exhibited by this family around the world. Active members of mixed-species flocks in the non-breeding season, they are mostly monogamous hole-nesters, and among their ranks are the species with the largest clutch sizes of all the passerines. Because they will nest in boxes put up by researchers, tit populations are some of the best studied of any passerines.



Blue Tit, *Cyanistes caeruleus*. Białowieza, Poland. © Mark A. Chappell.

in the north are timed to capitalize on the peak abundance of insect larvae. When excavating a nest, both members of a pair will participate, but only the female generally builds the nest. Incubation is mostly or entirely by the female, and it takes 12 to 14 days (rarely up to 18 in far-northern species). Both parents provision the young, and the chicks are in the nest for 16 to 22 days before they fledge. Fledglings are fed by the parents (and helpers if present) for as little as 6 days and as long as 80 days after leaving the nest.

**Conservation** Most parids face no immediate conservation concerns, as many have stable populations and quite a few species are adaptable to human disturbance, but four species (7%) are at risk in the tropics (1 VU, 3 NT). The vulnerable White-naped Tit *Parus nuchalis* of India is limited to a few widely scattered regions of acacia habitat, which is being cleared for agriculture, mining, and human population expansion. As the habitats become more human-altered, *P. nuchalis* loses out in competition with the human-compatible Great Tit *P. major*. The three near-threatened species are all range-restricted residents of tropical or subtropical islands, and they are all particularly susceptible to deforestation and habitat conversion. One of these, the Yellow Tit *P. holsti*, endemic to Taiwan, is also affected by taking for the cage-bird trade and competition with the Green-backed Tit *P. monticolus*, another species that fares better in human-altered habitats.

**Relationships** The tits and chickadees are oscine passerines treated here as part of the superfamily Sylvioidea (*sensu* Alström *et al.* 2013a), though placement is not certain; they may be only distantly related to the others in this group (Alström *et al.* 2006, Fuchs *et al.* 2006b, Johansson *et al.* 2008b, Olsson *et al.* 2013). Broadly, Paridae appears to be near the base of the sylvioid radiation, sister to most of the rest of Sylvioidea (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Alström *et al.* 2013a, Alström *et al.* 2014). Paridae appears most often to be sister to Remizidae, and these two taken together may be sister to Stenostiridae (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2013a) or to Hyliotidae (Barker 2014). The only study to include all three potential sister groups (Alström *et al.* 2014) found stenostirids and hyliotids in a polytomy with the clade made up of Paridae plus Remizidae. The Ground Tit *Pseudopodoces humilis*, long classified as an aberrant corvid, is now better understood to be a parid (James *et al.* 2003, Gill *et al.* 2005).



White-browed Tit, *Poecile superciliosus*. Mansu, China. © Dubi Shapiro.



Crested Tit, *Lophophanes cristatus*. Saint-Disdier, Le Dévoluy, France. © Ian Davies.

*Cephalopyrus*
1 species



*C. flammiceps*
Fire-capped Tit

*Sylviparus*
1 species



*S. modestus*
Yellow-browed Tit

*Melanochlora*
1 species



*M. sultanea*
Sultan Tit

*Pardaliparus*
3 species



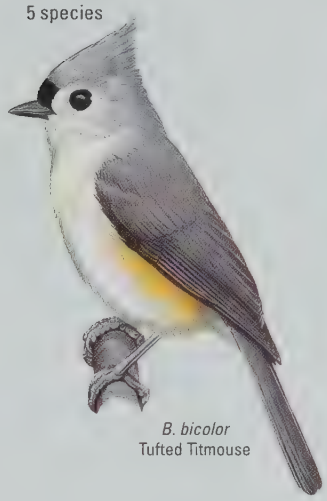
*P. elegans*
Elegant Tit

*Periparus*
4 species



*P. ater*
Coal Tit

*Baeolophus*
5 species



*B. bicolor*
Tufted Titmouse

*Lophophanes*
2 species



*L. dichrous*
Gray-crested Tit

*Sittiparus*
2 species



*S. varius*
Varied Tit

*Poecile*
12 species



*P. atricapillus*
Black-capped Chickadee

*Cyanistes*
3 species



*C. cyanus*
Azure Tit

*Pseudopodoces*
1 species



*P. humilis*
Ground Tit

*Parus*
3 species



*P. major*
Great Tit

*Machlolophus*
4 species



*M. xanthogenys*
Black-lored Tit

*Melaniparus*
15 species



*M. guineensis*
White-shouldered Black Tit

# REMIZIDAE
## Penduline-tits

3 genera • 11 species

**Related Families** Paridae (tits and chickadees), Stenostiridae (fairy flycatchers), Hyliotidae (hyliotas)

**Similar Birds** Tits (Paridae), bushtits (Aegithalidae), thornbills (Acanthizidae)

**Description**
- Plumage yellow in two species, but typically dull gray with accents in black, rufous, or yellow
- Wings rounded; tail medium to medium-long
- Body small, ovoid
- Bill short, sharply pointed and conical
- Head medium-sized with rounded profile; neck short, thick
- Legs and feet short, stout
- Males slightly more boldly patterned than females in *Remiz*

**Habitat** Most remizids live in open shrubby or woodland habitats ranging from desert scrub to marsh-side shrubs or open riparian woodlands, though one species inhabits rainforest.

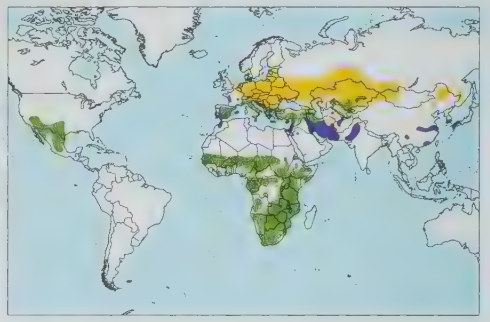
**Food** Remizids feed primarily on insects and other arthropods, with fruits, seeds, and nectar taken when insects are scarce. They behave much like parids while actively foraging near the tips of branches, often hanging upside-down. They also hold onto large prey items with one foot as they tear them apart, but, unlike parids, they often use their sharp bills to probe into a gall or stem and then open the bill to access prey hidden inside.

**Breeding** Remizids are predominantly monogamous with biparental care; some in *Anthoscopus* are cooperative breeders. Both polyandry and polygyny occur in *Remiz* populations, where the equality of parental roles has freed both sexes up for multiple mating opportunities. In *Remiz* and *Anthoscopus*, nests are pendulous, globular structures built mostly of plant down (such as that from *Phragmites* and *Poplar*) and wool, with a false entrance in those of *Anthoscopus*. Verdin nests have a core structure of soft plant material and wool, which is woven into surrounding and supporting branchlets, so from the outside they



Eurasian Penduline-tit, *Remiz pendulinus*. Bug River, Poland. © Paweł Wacławik.





The common name of these birds derives from the globular suspended nest that most of them build. Some of these nests are unparalleled in their ability to deceive predators; a prominently visible side-entrance leads to a shallow false cavity, and the entry to the true nest chamber is a tube that, when not being used, lies flattened as the roof of the false entrance! Some remizids also have what may be the most even sharing of parental duties among birds, but this behavior has a downside: because both members are capable of raising the young unassisted, each strives to abandon the nest before its mate does.



Verdin, *Auriparus flaviceps*. Near Palm Desert, California, USA. © Mark A. Chappell.

are imposing globes of sticks and spines to deter potential predators. Remizids generally lay 3 to 8 eggs. Both sexes build the nest, often with the male initiating as part of courtship. Both sexes incubate in all but Verdin, in which the female alone incubates. Both males and females (and helpers if present) provision the chicks. Incubation takes 14 to 17 days, and the chicks leave the nest after 17 to 24 days in the nest. The fledglings are often fed by a parent (or helpers) for up to three weeks post-fledging.

**Conservation** There are no conservation concerns for any members of this family.

**Relationships** Remizids are oscine passerines, here grouped with Sylvioidea, though they may be only distantly related to most members of that group. Recent molecular phylogenetic studies have supported the long-standing hypothesis that the penduline-tits are closely related to Paridae (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Alström *et al.* 2013a, Alström *et al.* 2014). These two families together may be sister to Stenostiridae (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2013a), or in a polytomy adding Hyliotidae (Alström *et al.* 2014). These four families seem most likely in turn to be sister to the rest of Sylvioidea (Beresford *et al.* 2005, Irestedt *et al.* 2011, Alström *et al.* 2014, Barker 2014).



Eurasian Penduline-tit, *Remiz pendulinus*. Bug River, Poland. © Paweł Wacławik.

*REMIZ*
4 species



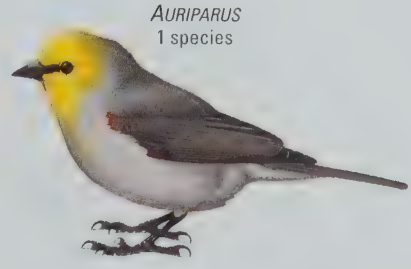
*R. pendulinus*
Eurasian Penduline-tit

*ANTHOSCOPUS*
6 species



*A. caroli*
Gray Penduline-tit

*AURIPARUS*
1 species



*A. flaviceps*
Verdin

# ALAUDIDAE
## Larks

21 genera • 95 species

Related Families Panuridae (Bearded Reedling), Nicatoridae (nicators)

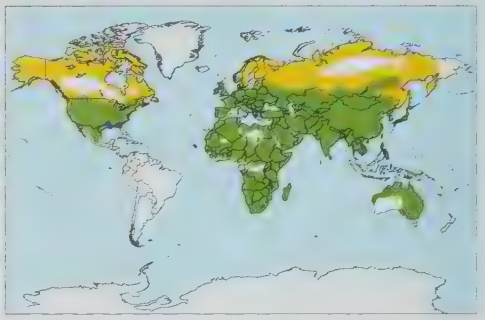
Similar Birds Pipits (Motacillidae), miners (Furnariidae), longspurs (Calcariidae)

Description
- Plumage cryptic, in browns, creams, and tans, some with black, yellow, or rufous accents
- Wings medium-long, pointed; tail short to medium-long, with white outer tail feathers in many species
- Body small to medium, cylindrical ovoid
- Bill ranging from short and stout to medium-long, thin, and decurved; nostrils often with bristly tufts
- Head medium-sized; neck medium length and thickness
- Legs and toes short to long; claw of hallux short and curved to straight, long, and sharp
- Males most often larger than females, and sometimes with different proportions of wings and bill



Archer's Lark, *Heteromirafra archeri*. Liben Plain, Ethiopia. © Ken Behrens.





This large family is almost exclusively Old World in distribution, with only one species native to the Western Hemisphere, and it reaches its center of diversity in the steppes, deserts, and savannas of Asia and Africa. These open-country birds can be maddeningly cryptic on the ground, but when they are courting, most species take to the air in song flights that are a refreshing departure from the sounds of the wind and two-dimensional vistas of the unrelieved plains. Males in some species have larger wings, perhaps to allow them to make these repeated song-flights more efficiently, and in some species males and females have bills of different lengths, associated with slight differences in diet and foraging tactics.

Habitat Larks live in just about every open habitat in their range, including open grassland, savanna, desert sand dunes and scrub, tundra, and agricultural fields.

Food Larks have diverse diets, ranging from insects and other invertebrates to seeds. Some species feed primarily on seeds and other grain, foraging on insects only during the breeding season. Others feed on invertebrate prey throughout the year.

Breeding Larks are monogamous with biparental care, though other strategies, including cooperative breeding with helpers retained from previously fledged offspring, polyandry, and semi-coloniality have been reported in a few species. Nests are most commonly placed in a hollow dug into the ground or in a dried hoof print of an ungulate. That hollow is lined with a grass nest that, in many species, is covered with a woven grass dome, and the nest is sometimes adorned or camouflaged with "ramparts" of stones or sticks extending out from the nest. Nest construction is usually by the female alone, as is incubation. Females lay 1 to 7 eggs. Incubation is short, from 8 to 16 days, and most chicks can leave the nest within 7 or 8 days of hatching, though some will remain if undisturbed for 12 to 14 days. Both male and female provision the chicks, and the young are fed by their parents for about a month after fledging.

Conservation Although populations of most



Eurasian Skylark, *Alauda arvensis*. Białowieża, Poland. © Mark A. Chappell.

species of lark are in good health, 13 species (14%) face conservation concerns (4 NT, 3 VU, 2 EN, 4 CR) and three are considered data deficient. One of two *Heteromirafra* species is critically endangered; Archer's Lark *H. archeri* inhabits an extremely small and disjointed range in Ethiopia where its dry grassland habitat is being converted to agriculture and settlements. These birds are extremely elusive, and in many sites there have been no confirmed sightings for decades. With an extremely small range and very few observations in Tanzania, Beesley's Lark *Chersomanes beesleyi* is not faring much better, though grazing there may be the only thing that is keeping its open grassland habitat from revegetating. Finally, the Raso Lark *Alauda razae*, which breeds on a single uninhabited islet in the Cape Verde Islands, has an estimated population of only 150, with a heavily male-biased sex ratio. This species is threatened by increasing drought, and though its islet is currently free of introduced predators, one introduced cat could easily spell the end of this species. The plights of the other species of conservation concern are similar: open grassland habitats are often tempting targets for "improvement" by agriculture, and fire suppression or removal of grazers can lead to replacement of grasslands with scrublands.



Gray-backed Sparrow Lark, *Eremopterix verticalis*. Namibia. © Ken Behrens.



Fawn-colored Lark, *Calendulauda africanoides*. Etosha NP, Namibia. © Ken Behrens.

**Relationships** Alaudidae is part of the large superfamily Sylvioidea of oscine passerines. Many recent molecular phylogenetic studies have shown that the larks are sister to the Bearded Reedling *Panurus biarmicus*, a species whose affinities have long been confusing and which is now placed in its own family, Panuridae (Alström *et al.* 2006, Fuchs *et al.* 2006b, Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2013a). These two families taken together may be sister to Nicatoridae (Fregin *et al.* 2012), and together these three are likely sister to the rest of the sylvioid radiation outside of Paridae and its allies (Barker *et al.* 2004, Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Gelang *et al.* 2009, Irestedt *et al.* 2011, Alström *et al.* 2011a, Fregin *et al.* 2012, Olsson *et al.* 2013, Barker 2014).

*ALAEMON*
2 species



*A. alaudipes*
Greater Hoopoe-Lark

*CHERSOMANES*
2 species



*C. albofasciata*
Spike-heeled Lark

*AMMOMANOPSIS*
1 species

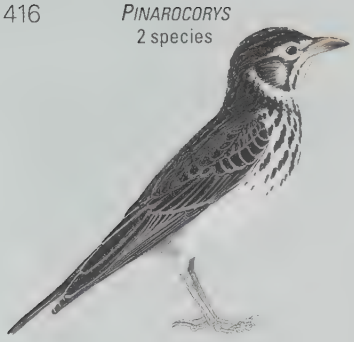


*A. grayi*
Gray's Lark

*CERTHILAUDA*
6 species

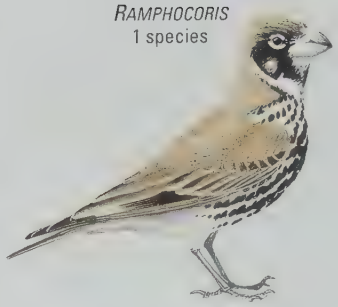


*C. curvirostris*
Cape Long-billed Lark



*Pinarocorys*
2 species

*P. nigricans*
Dusky Lark



*Ramphocoris*
1 species

*R. clotbey*
Thick-billed Lark



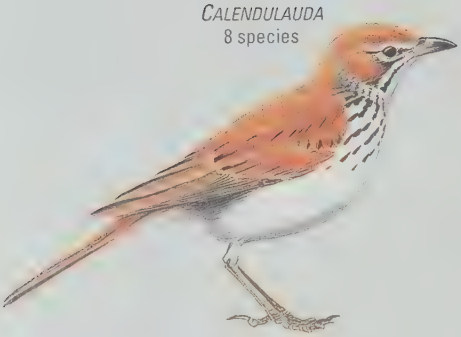
*Ammomanes*
3 species

*A. cinctura*
Bar-tailed Lark



*Eremopterix*
8 species

*E. nigriceps*
Black-crowned Sparrow-lark



*Calendulauda*
8 species

*C. burra*
Red Lark



*Heteromirafra*
3 species

*H. ruddi*
Rudd's Lark



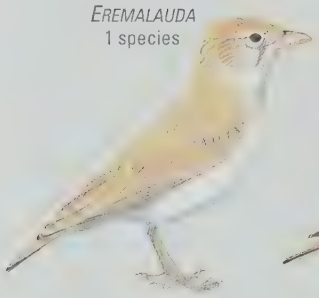
*Mirafra*
25 species

*M. africana*
Rufous-naped Lark



*Chersophilus*
1 species

*C. duponti*
Dupont's Lark



*Eremalauda*
1 species

*E. dunni*
Dunn's Lark



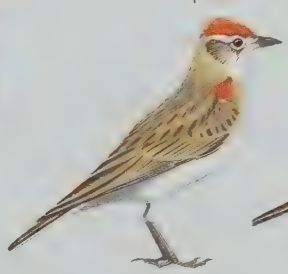
*Alaudala*
3 species

*A. rufescens*
Lesser Short-toed Lark



*Melanocorypha*
5 species

*M. mongolica*
Mongolian Lark



*Calandrella*
5 species

*C. cinerea*
Red-capped Lark



*Eremophila*
2 species

*E. alpestris*
Horned Lark



*Lullula*
1 species

*L. arborea*
Woodlark



*Spizocorys*
7 species

*S. personata*
Masked Lark



*Alauda*
4 species

*A. arvensis*
Eurasian Skylark



*Galerida*
6 species

*G. cristata*
Crested Lark

Passeriformes, Sylvioid Oscines

# PANURIDAE
## Bearded Reedling

1 genus • 1 species

**Related Families** Alaudidae (larks), Nicatoridae (nicators)

**Similar Birds** Parrotbills (Sylviidae), babblers (Timaliidae), long-tailed tits (Aegithalidae)

**Description**
- Plumage mainly rufous brown with patterning in gray, black, and cream
- Wings medium-short; tail long
- Body small, ovoid
- Bill short, stout, pointed
- Head medium-sized; neck short, thick
- Legs and feet medium length and thickness
- Males larger with gray head and black "mustache" plumes below eyes

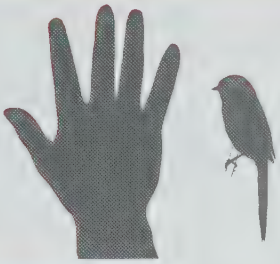
**Habitat** The Bearded Reedling, as its name suggests, is found mostly in dense reedbeds, primarily in *Phragmites*. It is also found in other marshy habitats, including around rushes, tussocks, and other low, dense, non-woody vegetation near wetlands.

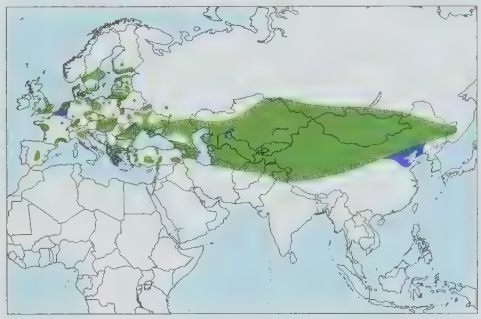
**Food** The diet of the Bearded Reedling varies dramatically during the course of the year. During the warmer months, insects and other invertebrates make up the majority of its diet. During late fall and winter, by contrast, reedlings feed primarily on seeds. With this change in diet comes a morphological change in the lining of the stomach, which becomes harder and thicker during the colder months. In addition, reedlings also consume grit to help break down the seeds.

**Breeding** Bearded Reedlings are generally monogamous with biparental care, but occasionally a male will mate and rear young with two females at once. They build a cup-shaped nest, usually out of reeds and other plant material, lined with feathers, hair, and *Phragmites* flower fluff. Nests are usually placed in among reed vegetation and sheltered above by it. Females lay 3 to 11 eggs, most often 4 to 8. Both adults are active in nest construction, incubation, and provisioning chicks. Incubation takes 10 to 14 days and nestlings are generally in the nest for 12 or 13, and sometimes up to 16, days. Fledglings are generally fed by the parents for about two weeks post-fledging.



Bearded Reedling, *Panurus biarmicus*.
Étang du Charnier, Languedoc-Roussillon, France. © Ian Davies.





These diminutive residents of reed beds in Europe and central Asia spend their lives in groups, eating insects in the spring and summer and reed seeds in the winter. Given their small size, they are surprisingly cold-hardy, moving to reed beds farther south only when winters are unusually harsh. Like many reed-dwellers, they are more easily heard than seen, though their distinctive nasal ping calls and a short-trilled song can sometimes lead observers to good views of the male's distinctive black plumes; these plumes form more of a mustache than a beard, drooping from the eyes down either side of the throat.

**Conservation** There are no immediate conservation concerns for the Bearded Reedling.

**Relationships** The Bearded Reedling is part of the large sylvioid radiation of oscine passerines. This bird has formerly been placed within various families—Sylviidae *sensu lato*, Timaliidae *sensu lato*, and Paridae. Recent molecular phylogenetic studies show that the Bearded Reedling is now best assigned to its own monotypic family, Panuridae. This family appears to be sister to Alaudidae (Alström *et al.* 2006, Fuchs *et al.* 2006b, Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2013a). These two families taken together may in turn be sister to Nicatoridae (Fregin *et al.* 2012) or to the rest of Sylvioidea (Alström *et al.* 2006, Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2013a).



Bearded Reedling, *Panurus biarmicus*. Hortobágy NP, Hungary. © Francesco Veronesi.

*PANURUS*
1 species



*P. biarmicus*
Bearded Reedling

# NICATORIDAE
## Nicators

1 genus • 3 species

Related Families Alaudidae (larks), Panuridae (Bearded Reedling), or dozens of other sylvioid families

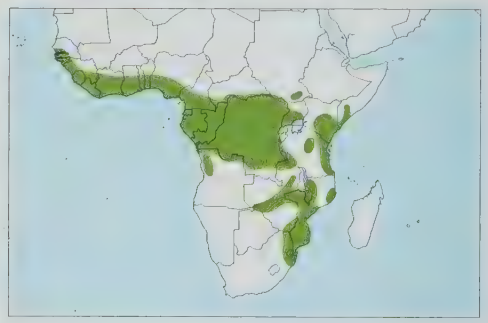
Similar Birds Greenbuls (Pycnonotidae), green bush-shrikes (Malaconotidae), figbirds (Oriolidae)

Description
- Plumage with yellow-olive back and head and pale underparts
- Wings medium length, with distinctive yellow or cream spots on coverts and tertials; tail long, rounded, with terminal yellow spots
- Body medium-sized, cylindrical ovoid
- Bill deep, straight, hooked
- Head medium-sized with distinctive upward-pointing pre-orbital (rather than rictal) bristles; neck medium
- Legs and feet short, thick



Western Nicator, *Nicator chloris*. Atewa, Ghana. © Nik Borrow.





Although their name derives from the Greek word *nikator*, meaning "conqueror," nicators are retiring insectivores that skulk about in sub-Saharan forested habitats. Their explosive songs of crescendoed whistles and guttural rattles are more often heard than the birds themselves are seen. With stout, hooked bills, these medium-sized greenish songbirds with spotted wings forage methodically for invertebrates, and sometimes frogs and lizards, on branches, vines, and trunks in the forest understory. They often flare their tail and wings to startle their prey out of hiding.

Habitat The nicators occupy a variety of habitats, ranging from shrubby savanna to dense primary tropical rainforest and from riparian forest to plantations and gardens in suburban areas. They prefer dense underbrush and are often very difficult to observe when not calling.

Food Nicators feed primarily on insects and other arthropods, especially larger grasshoppers, locusts, beetles, and caterpillars, as well as small vertebrates, including lizards and frogs. They sometimes join mixed-species flocks and skulk through mostly lower tiers of forest, often investigating dead-leaf clusters in branches or on the ground. They also sometimes follow ungulates to take prey that get flushed and to eat an occasional tick or insect off the ungulate.

Breeding Little is known of the breeding biology of the nicators, although they are believed to be monogamous with biparental care. The nests of nicators are relatively simple structures, being rough platforms of sticks reminiscent of the nests of doves and pigeons. Nests also incorporate some leaves, rootlets, and moss. Nests are fragile, and are bound together and supported by fungus that grows in and around the few sticks in the nest. Females lay 1 to 4 eggs. It is not known which sex builds, but the female alone incubates the eggs, and both parents feed the chicks, including for a period of time after fledging. Incubation takes 17 to 18 days, and chicks leave the nest 16 to 18 days post-hatch.

Conservation The nicators face no immediate conservation concerns.

Relationships Nicators are part of the sylvioid radiation of oscine passerines. They are a morphologically aberrant group long thought to be related to the bulbuls. Recent molecular phylogenetic studies have found instead that nicators are a relatively early offshoot within the larger superfamily Sylvioidea. Within this radiation, they may be sister to the clade made up of Alaudidae plus Panuridae (Fregin *et al.* 2012), in a polytomy with that clade and most of Sylvioidea (Alström *et al.* 2013a), or sister to the rest of Sylvioidea with (Olsson *et al.* 2013) or without Alaudidae (Beresford *et al.* 2005, Johansson *et al.* 2008b).



Eastern Nicator, *Nicator gularis*. Bonamanzi Game Reserve, Hluhluwe, KwaZulu-Natal, South Africa. © Guy Upfold.

*NICATOR*
3 species



*N. vireo*
Yellow-throated Nicator

Passeriformes, Sylvioid Oscines

# MACROSPHENIDAE
## Crombecs and Allies

6 genera • 18 species

**Related Families** About 20 other families in Sylvioidea, no clear closest relatives

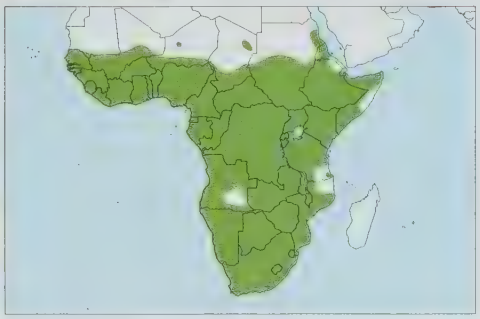
**Similar Birds** Warblers (Sylviidae, Cisticolidae, Acrocephalidae, Locustellidae, Scotocercidae), rockjumpers (Chaetopidae)

**Description**
- Plumage mainly colored in earth tones, some with olive and yellow
- Wings short to medium, rounded; tail extremely short to long
- Body small to medium, ovoid
- Bill generally short to medium; long, thin, and straight in *Macrosphenus*
- Head medium-sized; neck short and thick
- Legs and feet medium-long, thick
- Sexes similar



Moustached Grass Warbler, *Melocichla mentalis*. Nairobi NP, Kenya. © Nick Athanas.





**Habitat** Macrosphenids live in a variety of habitats, including dry, rocky scree slopes (Rockrunner), arid acacia scrubland and savanna (most crombecs), and tropical forest (longbills).

**Food** Macrosphenids feed primarily on insects and other invertebrates, mostly by gleaning them from twigs and leaves in lianas, trees, and bushes, often in very thick cover, as well as from the ground. In addition to invertebrates, some species take fruits or grass seeds on occasion. Most species are active foragers, crombecs especially calling and hopping from branch to branch as they search their territories for prey.

**Breeding** Knowledge of the breeding biology of this group is extremely spotty, but macrosphenids all appear to be monogamous with biparental care. Nests of this family are generally open cup nests made of coarse grass, leaves, or twigs lined with finer plant material, and most often concealed low to the ground in a grass tuft or other dense vegetation; in crombecs, the nests are suspended from small branches in a clump of vegetation near the edge of a shrub or small tree. Nests of crombecs are variously described as bag-, pear-, or bottle-shaped structures that are a deep cup with one side woven up to suspend the nest from the substrate, leaving a broad entrance above and to the side. More than other macrosphenids, perhaps, crombecs use spiderwebs in building their nests and attaching them to the substrate, often adorning the outside with cocoons, seeds, or bits of bark

This recently recognized collection of species from the once vast family Sylviidae consists of two small genera and four monotypic genera. The former are a set of plain-colored and very short-tailed woodland birds with short to long bills, and three of the other four are patterned and long-tailed birds of grassy or rocky lands. Many have a fondness for working spiderwebs into their nests. Most have songs that are much like the those of sylviid warblers, simple repeated phrases of whistles and chirps, often delivered in a rolling cadence and reedy voice, though the songs of some of the large species incorporate richer lark-like notes and cadence.



Rockrunner, *Achaetops pycnopygius*. Erongo Mountains, Namibia. © Ken Behrens.

fastened by spiderweb. Female macrosphenids lay 1 to 3 eggs. In most, both male and female appear to participate in nest construction, incubation of eggs, and raising the chicks. Incubation takes 14 to 17 days in *Sphenoeacus*, a duration that seems consistent with a few estimates from *Achaetops* and *Sylvietta* species, but shorter than the 21 days reported in *Cryptillas*. In *Sphenoeacus* the nestling period likewise is 14 to 16 days, and in the only *Sylvietta* species with data, the period is at least 17 days.

**Conservation** Though populations of most macrosphenids appear to be stable, one species (6%) is of considerable conservation concern (1 EN). The Pulitzer's Longbill *Macrosphenus pulitzeri* has a very small and fragmented range in the mountains of Angola and is threatened by slash-and-burn conversion of forest to coffee plantations. Another species, Philippa's Crombec *Sylvietta philippae*, is considered data deficient, though presumed to be fairly common in the acacia habitat in its very small and restricted range on a plateau in Somalia and adjacent Ethiopia.

**Relationships** Macrosphenidae is part of the sylvioid radiation of oscine passerines. As with other "Old World warbler" groups, the crombecs and their allies had long been considered to be part of the large and diverse Sylviidae *sensu lato*. Molecular phylogenetic studies suggest, however, that despite the disparate appearance of some, the six genera segregated here are a natural clade (Beresford *et al.* 2005, Johansson *et al.* 2008b) without any clear closest sister taxon. This appears to be an ancient lineage that diverged relatively deeply within the sylvioid radiation, being sister to all Sylvioidea minus the tits and their allies and the larks (Beresford *et al.* 2005, Johansson *et al.* 2008b, Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a) or to the same group with the additional exclusion of the swallows (Olsson *et al.* 2013).



Northern Crombec, *Sylvietta brachyura*. Richard Toll, Senegal. © Nik Borrow.

*SYLVIETTA*
9 species



*S. ruficapilla*
Red-capped Crombec

*CRYPTILLAS*
1 species



*C. victorini*
Victorin's Scrub Warbler

*ACHAETOPS*
1 species



*A. pycnopygius*
Rockrunner

*SPHENOEACUS*
1 species



*S. afer*
Cape Grass Warbler

*MELOCICHLA*
1 species



*M. mentalis*
Moustached Grass Warbler

*MACROSPHENUS*
5 species



*M. flavicans*
Yellow Longbill

Passeriformes, Sylvioid Oscines

# CISTICOLIDAE

## Cisticolas and Allies

27 genera • 154 species

**Related Families** Pycnonotidae (bulbuls), Macrosphenidae (crombecs and allies), Bernieridae (Malagasy warblers), Locustellidae (grassbirds and allies), Acrocephalidae (reed warblers and allies), Pnoepygidae (cupwings), Donacobiidae (Donacobius)

**Similar Birds** Thornbills (Acanthizidae), warblers (Acrocephalidae, Scotocercidae, Locustellidae, Macrosphenidae)

**Description**

- Plumage mainly brown, sometimes yellow or green, often streaked on back, and light below, with black or white contrasting accents
- Wings rounded; except in short-tailed *Camaroptera* species, tail medium to very long and held cocked over back in most long-tailed species
- Body small to medium, cylindrical ovoid
- Bill short to medium, straight, thin, pointed
- Head small to medium; neck short, thick
- Legs and feet medium to long
- Males with more boldly patterned plumage in some species



Golden-headed Cisticola, *Cisticola exilis*.
Fogg Dam, Northern Territory, Australia. © Con Foley.



**Habitat** Cisticolas and their allies live in a wide variety of habitats, from tropical rainforests, to arid shrubland and savanna, and extensive freshwater marshes. Cisticolids require some degree of vegetative cover for foraging and nesting.

**Food** Cisticolids feed primarily on insects and other invertebrates, occasionally taking very small vertebrates. Many species eat fruit and seeds occasionally, and it appears that some will also take nectar rarely.

**Breeding** Most cisticolids are monogamous with biparental care, and some are cooperative breeders, with the helpers helping most in group territorial defense. Polygyny is known in at least a few species. Most cisticolids build ball-shaped enclosed nests with a side entrance near the top, and a few build open cups. Most nests are made of grasses, rootlets, moss, and other plant material, and at least one species fastens its nest by burrowing into a pendant clump of fibrous *Usnea* lichen. The tailorbirds, camaropteras, and several of the prinias and cisticolas have the distinctive and enchanting habit of enclosing their nests in adjoining large leaves, which are drawn and stitched together with spiderwebs, insect silk, or plant

These fine-billed, long-tailed, warbler-like birds reach their greatest diversity in Africa, with good numbers in Asia and very few in Australia. The apalises are the most boldly colored and patterned in the family, and the cisticolas are the most speciose. Much like acrocephalids in their preference for grassy or wet areas, the different *Cisticola* species vary dramatically in size and in the character of syllables in their trilled songs. In many habitats of the Old World, these bright, repetitive songs are some of the most characteristic and often-heard. Cisticolas reach reproductive maturity as rapidly as any bird, and their high-throughput life history may be what makes them especially attractive as hosts for brood parasites, including cuckoos, honeyguides, and viduids.



Rudd's Apalis, *Apalis ruddi*. Cape Vidal, KwaZulu-Natal, South Africa. © Dubi Shapiro.

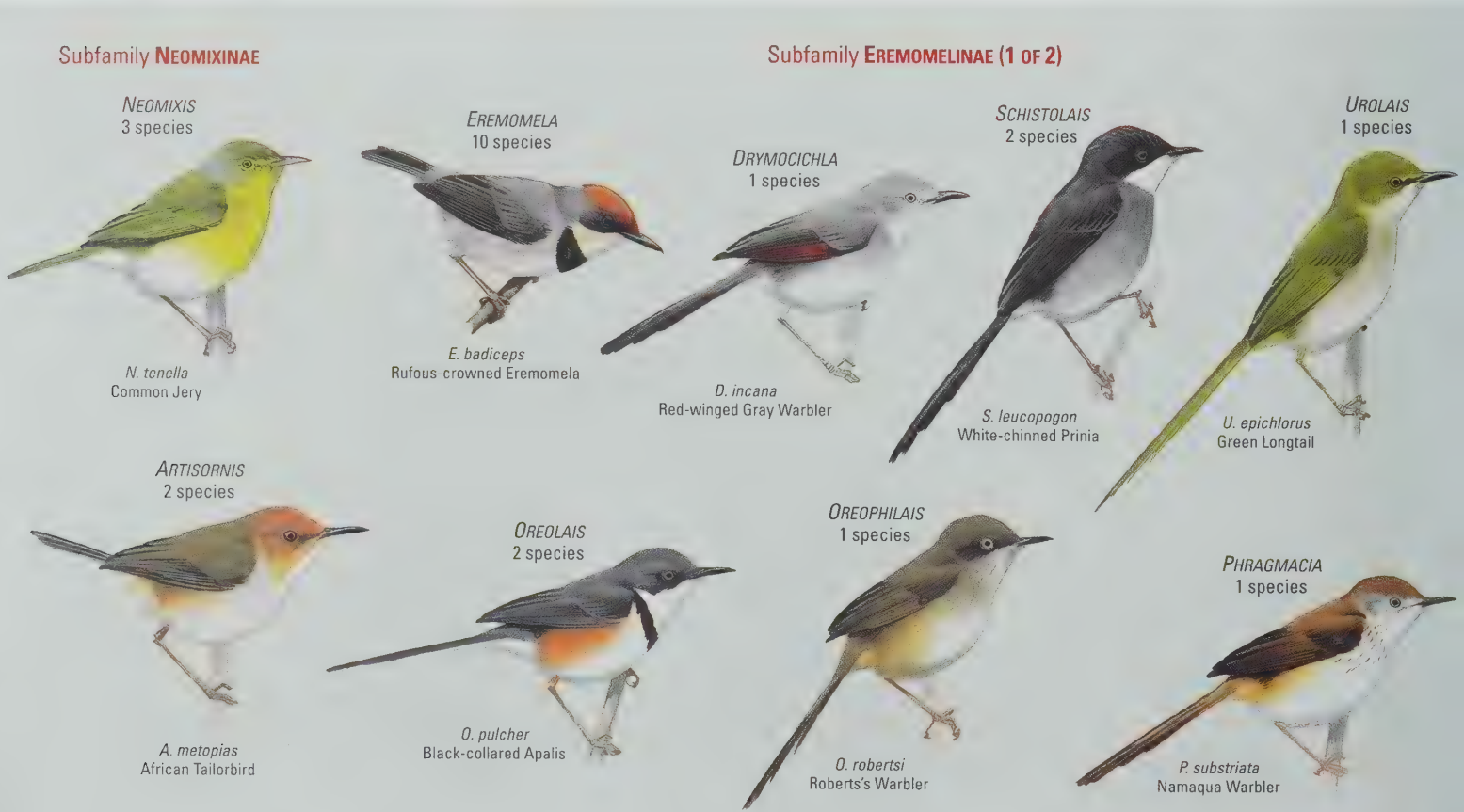
fibers to create a very durable protective shell for the nest. Female cisticolids lay 1 to 7 eggs, with most species falling in the range of 2 to 5. Nest-building and incubation are by both sexes or by the female alone. Incubation takes 10 to 18 days, 12 to 15 days in most species. Both parents feed the young, except in the few polygynous species, where males do not help. Nestlings are usually ready to leave the nest by 13 to 16 days after hatching, and fledglings are fed by the parents for at least two or three weeks after fledging. Cisticolas have among the shortest generation times of any bird, with some individuals known to begin breeding as soon as 27 days after fledging.

**Conservation** Although many species of cisticolids face no immediate conservation concerns, forest conversion to agriculture compounded by small range size is a threat to 11% of species (7 NT, 6 VU, 3 EN, 2 CR). Both critically endangered cisticolids are restricted-range species; the Long-billed Tailorbird *Artisornis moreaui* is restricted to two tiny patches of mountain forest widely separated in Tanzania and Mozambique, and the Taita Apalis *A. fuscigularis* is restricted to mountaintop forests in the Taita Hills of Kenya, where it is threatened by forest conversion to agriculture and climate change.

**Relationships** The cisticolas and their allies are part of the large sylvioid radiation of oscines. Previously allied with Sylviidae *sensu lato*, they were placed into their own family relatively early in the era of molecular phylogenetics (Sibley & Ahlquist 1990). More-recent phylogenetic studies have continued to support this separation of Cisticolidae, though its exact position within Sylvioidea is difficult to determine (Beresford *et al.* 2005, Johansson *et al.* 2008b, Irestedt *et al.* 2011). An early broad-scale comparison with sparse taxonomic sampling suggested that Cisticolidae may be sister to Sylviidae plus Timaliidae *sensu lato* (Barker *et al.* 2004), but later, more densely sampled phylogenies have indicated Cisticolidae to be sister to Macrosphenidae (Alström *et al.* 2006), to Pycnonotidae (Olsson *et al.* 2013), or to a radiation that includes many warbler groups (Bernieridae, Locustellidae, and Acrocephalidae) plus Pnoepygidae and Donacobiidae (Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a). Within Cisticolidae, we recognize four distinct subfamilies: Neomixinae, endemic to Madagascar, is sister to the remaining three distinct clades. Of the remaining three subfamilies, Eremomelinae is sister to Cisticolinae and Priniiane (Nguembock *et al.* 2007, Olsson *et al.* 2013).

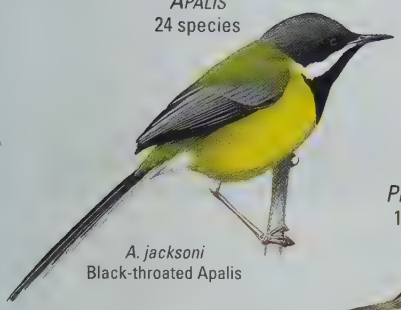


Karoo Eremomela, *Eremomela gregalis*. Springbok, Northern Cape, South Africa. © Hugh Chittenden.



## Subfamily EREMOMELINAE (2 OF 2)

*APALIS*
24 species



*A. jacksoni*
Black-throated Apalis

*SPILOPTILA*
1 species



*S. clamans*
Cricket Warbler

*PHYLLOLAIS*
1 species



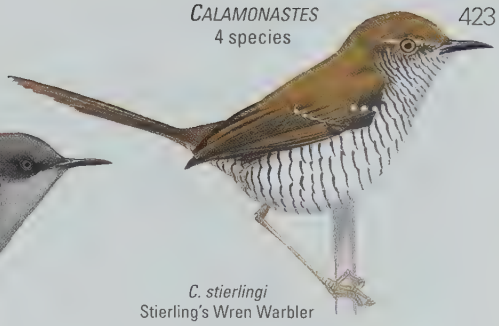
*P. pulchella*
Buff-bellied Warbler

*POLIOLAIS*
1 species



*P. lopezi*
White-tailed Warbler

*CALAMONASTES*
4 species



*C. stierlingi*
Stierling's Wren Warbler

*CAMAROPTERA*
4 species



*C. chloronota*
Olive-green Camaroptera

*MICROMACRONUS*
2 species



*M. leytensis*
Visayan Miniature Babbler

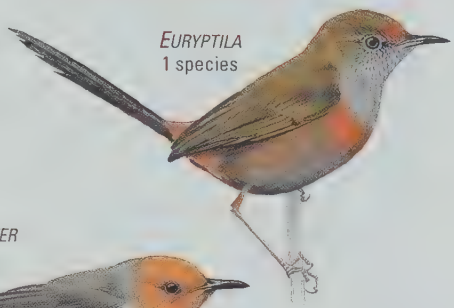
*GRAUERIA*
1 species



*G. vittata*
Grauer's Forest Warbler

## Subfamily CISTICOLINAE

*EURYPTILA*
1 species



*E. subcinnamomea*
Cinnamon-breasted Warbler

*SCEPOMYCTER*
2 species



*S. winifredae*
Winifred's Warbler

*INCANA*
1 species



*I. incana*
Socotra Warbler

*MALCORUS*
1 species



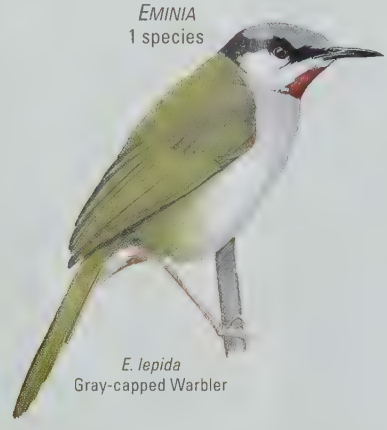
*M. pectoralis*
Rufous-eared Warbler

*HYPERGERUS*
1 species



*H. atriceps*
Oriole Warbler

*EMINIA*
1 species



*E. lepida*
Gray-capped Warbler

## Subfamily PRINIINAE

*CISTICOLA*
49 species



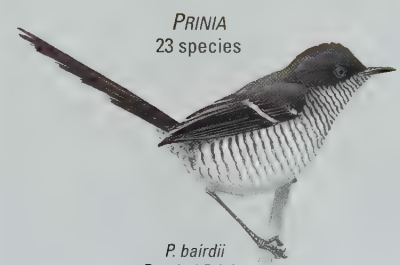
*C. juncidis*
Zitting Cisticola

*BATHMOCERCUS*
2 species



*B. rufus*
Black-faced Rufous Warbler

*PRINIA*
23 species



*P. bairdii*
Banded Prinia

*ORTHOTOMUS*
12 species



*O. sutorius*
Common Tailorbird

# ACROCEPHALIDAE

## Reed Warblers and Allies

6 genera • 53 species

**Related Families** Pnoepygidae (cupwings), Locustellidae (grass warblers and allies), Donacobiidae (Donacobius), Bernieridae (Malagasy warblers)

**Similar Birds** Babblers (Timaliidae), warblers (Sylviidae, Locustellidae, Scotocercidae, Cisticolidae, Acanthizidae, Parulidae)

**Description**

- Plumage predominantly brown or olive, less often yellow, commonly with lighter eye-stripe and streaking on back
- Wings short to medium, often rounded; tail medium to long, rounded and often graduated
- Body small to medium, cylindrical ovoid
- Bill medium to medium-long, straight, thin
- Head medium-sized; neck short and thick
- Legs and feet medium-sized
- Sexes similar

**Habitat** Acrocephalids live in a variety of habitats, from marshes dominated by reeds to dry scrub and forests.

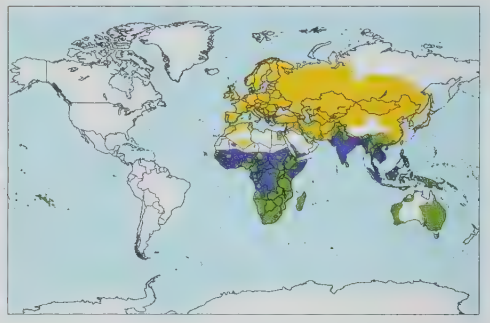
**Food** Acrocephalid diets consist primarily of insects, supplemented at times with fruit. Insect prey are gleaned from leaves and branches, picked from the surface of the water, or caught in flight. Some species also take small aquatic vertebrates, including small fish and frogs.

**Breeding** A variety of breeding strategies has evolved in the reed warblers. Although most species are monogamous, several species are polygynous, and at least one, the Seychelles Warbler *Acrocephalus sechellensis* breeds cooperatively. In the Seychelles Warbler, helpers are offspring from previous nesting attempts, and they feed chicks only if they are full or half siblings. The Aquatic Warbler *A. paludicola* has one of the most extreme polygynous systems, bordering on promiscuity, with single clutches of eggs being fathered by up to five different males. Copulation, which in most birds takes only seconds, can average 25 minutes duration in this species. Acrocephalids generally build cup nests that are constructed of grasses and reeds and lined with finer material, including plant down and feathers. Nests are placed among reeds or in shrubs or trees. Females typically lay 2 to 6 eggs. In most monogamous species, either both the male and



Great Reed Warbler, *Acrocephalus arundinaceus*. Białowieza, Poland. © Mark A. Chappell.





These familiar birds of marshes, swamps, and woodlands throughout the Old World are united by their plain plumage in brown and olive tones, most species with a faint eye-line, but with extensive striping and patterning on the back in many. Many are endemics on Pacific islands, though interestingly, the islands apparently were colonized in several separate waves, so nearby species are not necessarily the most closely related. Some members of this family sing long, complicated songs with many syllables learned over time, yet it is still not entirely clear how the size of the male's vocal repertoire or the complexity of his songs is related to sexual selection in these species.



Sedge Warbler, *Acrocephalus schoenobaenus*. Delft, The Netherlands. © Reinder Doeleman.

female are active in nest construction and incubation or the female does these alone. Except in the most extreme polygynous species, in which males contribute no parental care, parents of both sexes, and helpers if present, feed the chicks. Incubation takes 12 to 14 days, and nestlings leave the nest after another 12 to 14 days.

**Conservation** Although the majority of acrocephalids face no immediate conservation concerns, far too many (31%) are at risk (2 NT, 7 VU, 6 EN, 2 CR). Most of these are in the genus *Acrocephalus*, and the species most threatened are island forms that have suffered from introduced mammals and snakes and mainland forms (including several migrants) that have restricted ranges and are dependent on marsh ecosystems that are often drained or drastically altered by human activities. The critically endangered Millerbird *Acrocephalus familiaris* once lived on the islands of Laysan and Nihoa in the Hawaiian chain, but was extirpated from the former by habitat losses caused by introduced rabbits. Recent re-introduction to Laysan, where the rabbits have been exterminated, may help make the species population, now fewer than 1000, less vulnerable to fire and hurricanes. Similarly, the Nightingale Reed Warbler *A. luscinius* lives on the scattered islands of the Mariana archipelago. Several local races have gone extinct, mostly because of habitat alteration and predation by introduced snakes and mammals.



Black-browed Reed Warbler, *Acrocephalus bistrigiceps*. Sengkang, Singapore. © Con Foley.

**Relationships** The reed warblers represent one of several newly recognized warbler families in the large sylvioid radiation. Although they have long been considered part of an expansive family of Old World warblers (Sylviidae *sensu lato*), recent molecular phylogenetic evidence has shown that many of these lineages are only distantly related to one another (Alström *et al.* 2006, Fregin *et al.* 2009, Gelang *et al.* 2009, Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a). Within Sylvioidea, Acrocephalidae may be sister to Pnoepygidae (Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013) or to a larger clade made up of Donacobiidae, Bernieridae, and Locustellidae (Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Alström *et al.* 2011a).



# PNOEPYGIDAE
## Cupwings

1 genus • 4 species

**Related Families** Acrocephalidae (reed warblers and allies), Bernieridae (Malagasy warblers), Locustellidae (grassbirds and allies)

**Similar Birds** Wrens (Troglodytidae), small antpittas (Grallariidae), wren-babblers (Timaliidae and Pellorneidae)

**Description**
- Plumage brown with lighter spotting or scaling, generally lighter beneath with scaled pattern on breast and belly
- Wings very short, rounded, concave within; tail short with very reduced rectrices
- Body very small, rounded ovoid
- Bill medium-long, straight, thin
- Head medium to large; neck short, thick
- Legs and feet long and stout
- Sexes similar

**Habitat** Cupwings are birds of wet forest habitats, spending much of their time on or near the ground in the dense undergrowth and moss.

**Food** *Pnoepyga* species are insectivores, foraging for insects and other arthropods on or near the ground and in and under dead leaves and clumps of moss. Though cupwings apparently have never been seen eating seeds or fruits, the few stomachs that have been examined contained a small proportion of seeds.

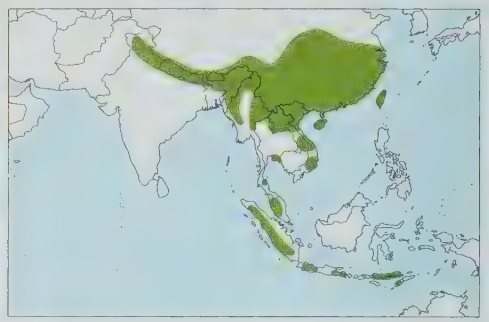
**Breeding** Very little is known about the breeding biology of pnoepygids. They appear to be monogamous. Apparently, both sexes build the nest, incubate, and provision the young. The nest is constructed of moss, rootlets, and fibers woven into a ball shape with an entrance on the upper side; the nest itself is woven into an existing clump of moss or epiphytes in a low tree branch, among rocks, or on a bank. Females lay 2 to 6 eggs, with smaller clutches in the tropics. One species has an incubation period of 12 to 14 days, but there is no further information on development of young.

**Conservation** The cupwings face no immediate conservation concerns.



Taiwan Cupwing, *Pnoepyga formosana*. Dasyueshan, Taiwan. © Francesco Veronesi.





The cupwings, also referred to as pygmy wren-babblers, are tiny, almost tail-less, brown birds of the undergrowth of Southeast Asian forests. Their name derives from the cup-like shape of their short rounded wings, whose remiges have a strong camber-curvature toward the body. These stubby little birds hop, dart, and bound along the ground and up moss-covered branches a meter or so in search of their prey, nervously flicking their wings as they go. Their distinctive songs are sibilant warbles reminiscent of wrens and other small sylvioids, and as with most shy birds of dense undergrowth, the presence of cupwings along a path through their forest habitat is more often indicated by their calls than sightings.

**Relationships** Pnoepygidae forms part of the superfamily Sylvioidea of oscine passerines. Until recently, the cupwings were considered to be part of the formerly large babbler family (Timaliidae *sensu lato*). Recent molecular phylogenetic studies have shown, however, that the cupwings are only distantly related to the various lineages formerly grouped into the Timaliidae, and that they belong instead with other groups of the sylvioid radiation (Gelang *et al.* 2009, Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a). The precise relationships of the cupwings within Sylvioidea remain uncertain: they may be sister to a clade that contains Cisticolidae and Pycnonotidae (Gelang *et al.* 2009), to Acrocephalidae (Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013), or to a larger clade that includes Acrocephalidae, Bernieridae, and Locustellidae (Alström *et al.* 2011a, Irestedt *et al.* 2011). We here give preference to the latter two hypotheses, as the studies that support them have better taxon-sampling of each of the putative sister groups.



Pygmy Cupwing, *Pnoepyga pusilla*. Lingmethang Road, Mongar District, Bhutan. © Jon Irvine.

*PNOEPYGA*
4 species



*P. albiventer*
Scaly-breasted Cupwing

Passeriformes, Sylvioid Oscines

# LOCUSTELLIDAE
## Grassbirds and Allies

13 genera • 57 species

**Related Families** Donacobiidae (Donacobius), Bernieridae (Malagasy warblers)

**Similar Birds** Other warblers (Scotocercidae, Acrocephalidae), cisticolas (Cisticolidae), Rufous-rumped Grassbird (Pellorneidae), grass warblers (Macrosphenidae)

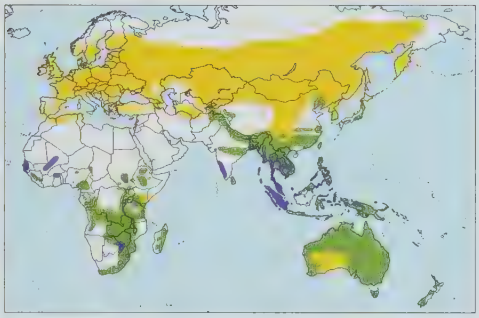
**Description**

- Plumage generally brown, streaked especially in grassbirds (many genera)
- Wings medium-long, rounded; tail long, rounded, graduated, with very long undertail coverts in *Locustella* species
- Body small to medium, cylindrical ovoid, elongate
- Bill medium length, thin, straight, stouter in grassbirds
- Head medium-sized; neck medium thickness and length
- Legs and feet generally medium-long
- Sexes similar



Tawny Grassbird, *Cincloramphus timoriensis*. Mungalla Station, Queensland, Australia. © Tony Ashton.





**Habitat** Locustellids live in a wide variety of habitats with dense undergrowth, including forest, marshes, swampland, and seasonally arid grasslands.

**Food** Most locustellids have a varied diet of insects and other invertebrates, especially spiders, small snails, worms, and amphipods. Some species take small amounts of seeds as well. Most species obtain their food by gleaning, and they spend most of their time on the ground or low in vegetation, picking insects from inside dense brush or from the ground.

**Breeding** Most locustellids appear to be monogamous with biparental care, although *Cincloramphus* species are polygynous and others may be at times. Locustellid nests are typically deep cups built of various types of vegetation, including grasses, twigs, rootlets, moss, and reeds, often with a dome and side entrance, and lined with finer vegetation or hair and usually placed in dense vegetation within a meter of the ground or water. Both male and female are typically active in the breeding attempt, with both sexes constructing the nest. Incubation is by both sexes or by the female alone, and both parents feed the young. Clutches range from 1 to 7 eggs, and incubation takes 10 to 16 days. Nestling periods are 10 to 17 days, but there is apparently no information on post-fledging parental care.

This family's ranks contain many secretive, brown birds of shrubs, thickets, and marshes. Masters at skulking and running through what seems impenetrable vegetation, many are reluctant to fly, preferring to run away mouse-like. When alarmed they may fly, but weakly, returning quickly and invisibly to their sheltering thickets and tangles. Most are first revealed to observers by their songs, which vary in length from short trills and chirps repeated in series up to long insect-like trills. Most have fine bills, lightly proportioned bodies, and long graduated tails. As their heavily vegetated habitat might suggest, they construct their nest of grass, forming it into a ball or deep cup on or near the ground in tangles of vegetation.



Fernbird, *Poodytes punctatus*. The Snares, New Zealand. © G. B. Baker.

Conservation Though most locustellid populations appear stable for now, 14 species (25%) are of conservation concern (7 NT, 5 VU, 2 EN). The endangered Grauer's Swamp Warbler *Bradypterus graueri* is threatened primarily by the conversion of its preferred marshes and swamps to cultivated land. The endangered Long-legged Thicketbird *Megalurulus rufus* is restricted to a tiny range, apparently only one of the islands in the Fijian chain, where it is threatened by forest clearing and introduced mongoose predators. Other species, including some grassbirds, are considered vulnerable, similarly being threatened by habitat loss, human disturbance, and introduced predators.

Relationships Locustellidae is part of the sylvioid radiation of the oscine passerines. Prior to extensive genetic analysis of the Old World "warblers," locustellids were considered to be part of Sylviidae *sensu lato*. However, a distinct position of Locustellidae within this large sylvioid radiation of largely Old World taxa is remarkably well resolved: it appears to be sister to a clade formed by Donacobiidae plus Bernieridae (Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013). This well-supported clade of three families is likely sister to Acrocephalidae plus Pnoepygidae (Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).



Grasshopper Warbler, *Locustella naevia*. Ardenne, Belgium. © Ph Moës.



Little Grassbird, *Poodytes gramineus*. Gatton, Queensland, Australia. © B. G. Thomson.

*Locustella*
23 species



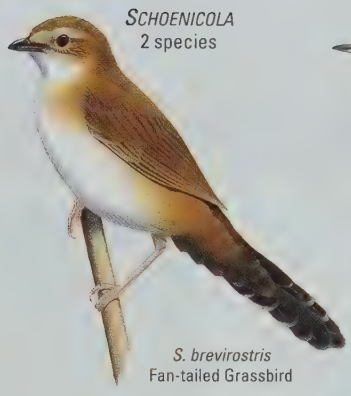
*L. lanceolata*
Lanceolated Warbler

*Megalurus*
1 species



*M. palustris*
Striated Grassbird

*Schoenicola*
2 species



*S. brevirostris*
Fan-tailed Grassbird

*Bradypterus*
11 species



*B. alfredi*
Bamboo Warbler

*Cincloramphus*
4 species



*C. cruralis*
Brown Songlark

*Megalurulus*
4 species



*M. rubiginosus*
Rusty Thicketbird

*Poodytes*
4 species



*P. punctatus*
Fernbird

*Buettikoferella*
1 species



*B. bivittata*
Buff-banded Bushbird

*Amphilais*
1 species



*A. seebohmi*
Madagascan Grassbird

*Elaphrornis*
1 species



*E. palliseri*
Sri Lankan Bush Warbler

*Chaetornis*
1 species



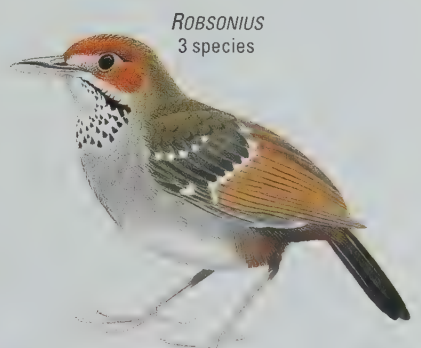
*C. striata*
Bristled Grassbird

*Malia*
1 species



*M. grata*
Malia

*Robsonius*
3 species



*R. rabori*
Rusty-headed Babbler

# DONACOBIIDAE

## Donacobius

1 genus • 1 species

Related Families Bernieridae (Malagasy warblers), Locustellidae (grassbirds and allies)

Similar Birds Wrens (Troglodytidae), mockingbirds (Mimidae), babblers (Timaliidae, Leiothrichidae)

Description
- Plumage with dark upperparts and black cap and buff-yellow underparts with faint black barring on flanks
- Wings medium length, rounded; tail long, graduated, with white-tipped and margined rectrices
- Body medium-sized, cylindrical ovoid, elongate
- Bill medium-long, straight
- Head medium-sized; neck medium length and thickness
- Legs and feet medium in length, stout
- Males slightly larger than females

Habitat The Donacobius lives in low-elevation tropical and subtropical marshes and swamps, and along water edges.

Food Donacobiuses feed primarily on insects. They glean and probe almost exclusively in bushes, rarely foraging on the ground and occasionally catching prey in the air.

Breeding Donacobiuses are monogamous and often breed cooperatively, with up to two retained offspring from previous breeding attempts. Members of the group often forage together, and they actively defend the territory together against neighboring Donacobius family groups and any predators that visit. The deep cup-shaped nest is built mostly by the female and made of plant fibers, snake skins, and other flexible materials. It is placed in reeds or shrubbery less than a meter above the water or a little higher if over dry ground. Females lay 2 or 3 eggs, and they alone incubate. Incubation takes 16 to 18 days, and the nestlings leave the nest about 17 to 18 days post-hatch. Both parents and any helpers provision the chicks. The fledglings presumably are fed for some time after they leave the nest.

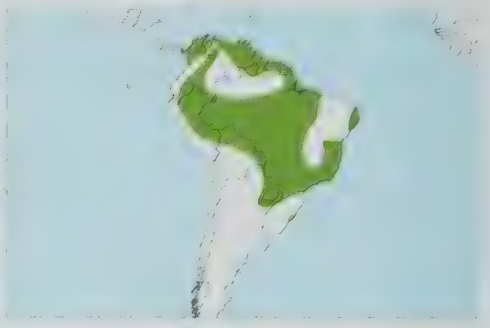
Conservation There are no conservation concerns for this relatively widespread and often common bird.

Relationships Donacobiidae is part of the largely Old World sylvioid radiation of oscine passerines. Before being recognized as a distinct lineage in Sylvioidea, *Donacobius* had most often been grouped with Troglodytidae or Mimidae (Kiltie & Fitzpatrick 1984). In modern analyses with broad taxon-sampling, *Donacobius* is instead repeatedly discovered to be sister to the Malagasy radiation of warblers, Bernieridae, and these two families are in turn sister to Locustellidae (Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).



Donacobius, *Donacobius atricapilla*. Near Sachatamia Lodge, Ecuador. © John McKean





This lanky passerine of South American marshes and swamps makes a series of whistles and churrs that could pass for a really large wren or a babbler, yet in its combination of color and form it is like no other bird. It is therefore no great surprise that the relationships of this bird, which many systematists had tried to wedge in with the wrens for a long time, does not belong with any group of Neotropical birds. Remarkably, though, its closest relatives are a hemisphere away in Eurasia and Madagascar. Groups of Donacobiuses vigorously defend their narrow territories, singing from exposed perches with sex-specific songs delivered antiphonally, making them conspicuous occupants of the wetlands they frequent.



Donacobius, *Donacobius atricapilla* Transpantaneira near Pousada Rio Claro, Mato Grosso, Brazil. © D. W. Winkler



Passeriformes, Sylvioid Oscines

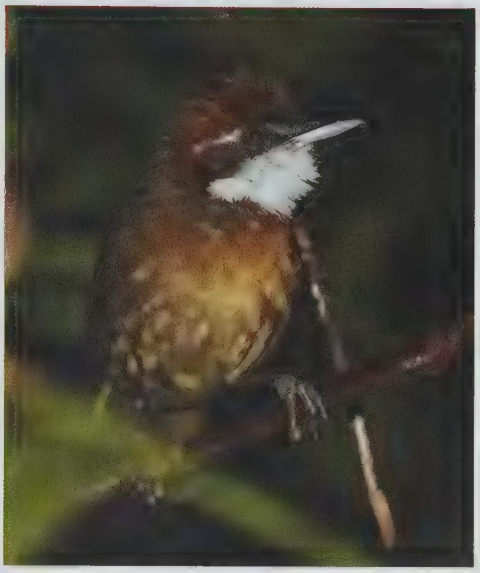
# BERNIERIDAE
## Malagasy Warblers

8 genera • 11 species

**Related Families** Donacobiidae (Donacobius), Locustellidae (grassbirds and allies)

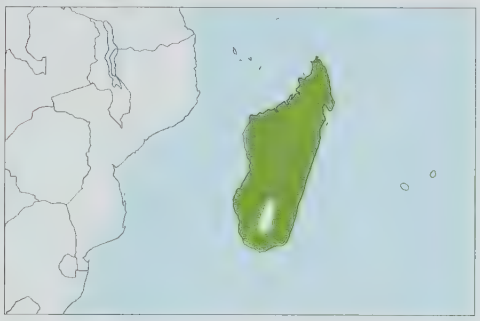
**Similar Birds** Old World warblers (Sylviidae, Locustellidae, Phylloscopidae, Cisticolidae, Acrocephalidae), greenbuls (Pycnonotidae), babblers (Timaliidae)

**Description**
- Plumage relatively dull, tones mostly in drab olive-yellow and brown; tetrakas (genus *Xanthomixis*) more brightly colored, with bright yellow underparts
- Wings medium-short; tail medium-long, rounded, graduated
- Body small, cylindrical ovoid
- Bill medium to medium-long, straight, thin
- Head medium-sized; neck medium, thick
- Legs medium-long; feet small
- Sexes similar



White-throated Oxylabes, *Oxylabes madagascariensis*. Masoala NP, Madagascar. © Nick Athanas.





**Habitat** Bernierids live in a variety of habitats, although most occupy dense, humid forests ranging from sea level up through the mountains.

**Food** Little is known about the feeding ecology of the Malagasy warblers. Limited evidence suggests that they are insectivorous, feeding on a wide range of insects and spiders, and, at least in *Bernieria*, small vertebrates such as geckos and occasional seeds. Many glean insects from branches and leaves, whereas others probe crevices, and still others forage mainly on the ground. Many species join in mixed-species foraging flocks.

**Breeding** Very little is known about the breeding biology of any of the bernierids. Current information suggests that most are monogamous with biparental care, and at least some of the *Xanthomixis* species may breed cooperatively, as three adults have been seen feeding chicks. Limited observations indicate that nests are cup-shaped and placed not far above the ground in a low shrub or tree. Nests are constructed of a variety of plant materials, including leaves, grass, dead leaves, and palm fibers. Many have moss on the inside or outside and some bernierids use spider silk in nest construction and to attach external adornments. Females typically lay 2 to 4 eggs. In those few species with information, both male and female construct the nest. Information from only two species suggests an incubation period of at least 13 days in one and

Few families have so many genera for as few species as this family contains, and this is testimony to the sylvioid version of the now-familiar story of upstart adaptive radiation on the seemingly enchanted island of Madagascar. This small family of forest and woodland birds includes examples of several themes in the evolution of the "Old World warblers" that have never come into being elsewhere. Some members of this family are more boldly patterned, longer-billed, or longer-tailed than is typical for the leaf or reed warblers that they most resemble. However, ornithologists have come to expect nothing less from any group that has inhabited this fertile proving ground for uniqueness for more than a few million years.



Long-billed Tetraka, *Bernieria madagascariensis*. Ankarafantsika NP, Madagascar. © Nick Athanas.

16 to 17 days in the other. Lack of a brood patch on breeding-season males suggests that females alone incubate. Both males and females provision chicks in *Xanthomixis*. No other information is available on parental care or offspring development.

**Conservation** As with many other groups in Madagascar, bernierids are declining due to logging and slash-and-burn conversion of forest and woodland to agriculture, and five species (45%) are of current conservation concern (3 NT, 2 VU). The two vulnerable species, Appert's and Dusky Tetraka (*Xanthomixis apperti* and *X. tenebrosa*, respectively), have small and fragmented ranges. The former is restricted to four small forest patches in the southwest; the Dusky Tetraka, the most mysterious and elusive bird in Madagascar, occupies lowland humid forest in the northeast, a habitat that continues to suffer from logging.

**Relationships** Bernieridae is part of the sylvioid radiation of the oscine passerines. The relationships of the Malagasy warblers have long been uncertain, and prior to molecular phylogenetic studies, the current members of Bernieridae had never previously been grouped together into a single family; instead, these various lineages had been placed with Sylviidae *sensu lato*, Pycnonotidae, and Timaliidae *sensu lato*. The realization that many of these outwardly dissimilar passerines are closely related to each other provides further evidence that Madagascar has been a hotspot of avian diversification (Cibois *et al.* 2001, Johansson *et al.* 2008a). Within Sylvioidea, Bernieridae is likely sister to Donacobiidae of South America, and these two taken together are in turn sister to Locustellidae (Johansson *et al.* 2008b, Gelang *et al.* 2009, Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013). Within Bernieridae, the family is largely split into two main clades, with a clade made up of *Xanthomixis* and *Crossleyia* species sister to the remaining genera, and with extensive cryptic diversity detected in many of the lineages (Block 2012).



Short-billed Tetraka, *Xanthomixis zosterops*. Ranomafana NP, Madagascar. © Ken Behrens.



Passeriformes, Sylvioid Oscines

# HIRUNDINIDAE

## Swallows and Martins

20 genera • 83 species

**Related Families** Relationships are unclear, but most-likely sister taxa include Scotocercidae (bush warblers), Aegithalidae (long-tailed tits), Phylloscopidae (leaf warblers), Sylviidae (sylviid warblers and parrotbills), Pycnonotidae (bulbuls), and Timaliidae (tree babblers)

**Similar Birds** Swifts (Apodidae), treeswifts (Hemiprocnidae), woodswallows (Artamidae)

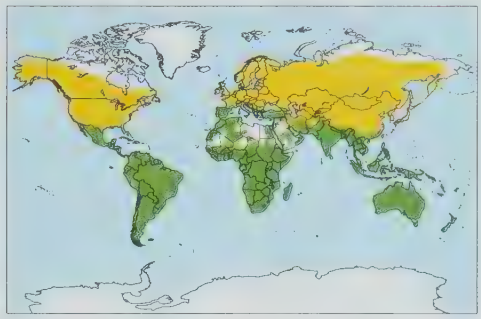
**Description**

- Plumage of gray, brown, iridescent blue or green, or violet above, usually lighter brown, rufous, or white below
- Wings long, pointed; tail short to medium, square to deeply forked
- Body small to medium, elongate cylindrical ovoid
- Bill short, broad-gaped, flat
- Head medium-sized; neck short, thick
- Legs short; feet small
- Males often more colorful and boldly patterned than females, often with elongated tail streamers



Tree Swallow, *Tachycineta bicolor*. Ithaca, New York, USA. © D. W. Winkler.





**Habitat** Swallows live in almost all open habitat types, with only a few living in densely forested areas, and most species often found near water.

**Food** Hirundinids are almost exclusively insectivorous, primarily feeding on insects on the wing. However, some species, most notably the Tree Swallow *Tachycineta bicolor*, feed on berries during migration and winter when flying insects are more scarce.

**Breeding** Swallows are generally monogamous with biparental care, albeit with high levels of extra-pair fertilizations documented in some species and low levels of simultaneous polygyny in some. Swallow nests are of three general types: burrows in sandy soils, adopted cavities, and nests made of mud. Within the last, shapes vary from open cups, through closed cups, to retort- or globe-shaped with long access tunnels. Females lay 2 to 8 eggs, with most clutches in the range of 3 to 6 and larger clutches away from the tropics. Nest-building and incubation are by both sexes or by the female alone, and the nestlings are provisioned by both attending adults. Incubation takes 10 to 21 days, with most species in the range of 14 to 18 days, and the nestlings leave the nest at three to four weeks

Like the swifts, treeswifts, and woodswallows that they superficially resemble, swallows are highly specialized aerial insectivores. Feeding on aerial plankton that is constantly varying with the vagaries of the weather, their lifestyle is in many ways more like that of a storm-petrel than a typical passerine. They cannot defend a territory around foraging grounds, and they split up their habitats by places where they nest and what kind of nest they build more than by what they eat. With nest-site often comes social system, and this varies from solitary to highly colonial. Intensely territorial in the immediate vicinity of their nests, most migratory species aggregate in enormous nocturnal roosts once the breeding season is past.



Cliff Swallow, *Petrochelidon pyrrhonota*. Ayr Hill Farm, Cheshire, Massachusetts, USA. © Ian Davies.

post-hatch. Post-fledging parental care varies from none to feeding for up to ten days post-fledge.

Conservation Habitat destruction is the primary threat facing hirundinids, seven species of which (9%) are of conservation concern (4 VU, 2 EN, 1 CR). The critically endangered White-eyed River Martin *Pseudochelidon sirintarae*, known only from its wintering grounds in Thailand, has not been reliably seen since the 1980's and may well be extinct. Its decline may be linked to habitat loss and hunting of the large flocks that used to gather at winter roost sites, but this is hard to judge without knowledge of its breeding grounds and threats that might have been at play there. A number of other swallow species are range-restricted and of concern, including Bahama and Golden Swallows (*Tachycineta cyaneoviridis* and *T. euchrysea*, respectively) in the Caribbean and Blue and White-tailed Swallows in Africa (*Hirundo atrocaerulea* and *H. megaensis*, respectively). Aerial insectivores in North America and Europe appear to be suffering range-wide declines, so far very poorly understood, but climate change and increased effectiveness of agricultural insect control appear to be likely contributing factors.

Relationships Hirundinidae is part of the sylvioid radiation, but its relative position within this large superfamily remains uncertain. Hirundinidae is perhaps sister to a clade that includes Scotocercidae, Aegithalidae, and Phylloscopidae (Alström *et al.* 2006, Barker *et al.* 2004), or in a polytomy of three clades: Hirundinidae, Pycnonotidae, and the above group plus the babbler radiation including Timaliidae, Sylviidae, and others (Alström *et al.* 2011a). Most recent studies, however, have found Hirundinidae involved in polytomies that include various groupings of most of the rest of Sylvioidea (Johansson *et al.* 2008b, Gelang *et al.* 2009, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013). We have made a tentative list of related families above, but clearly, much further work will be required to identify the sister taxa to Hirundinidae with greater certainty. Within Hirundinidae, there are two distinct subfamilies, with the two species in Pseudochelidoninae sister to the rest of the species in Hirundininae (Sheldon *et al.* 2005) and three clades in the latter distinguishable largely by nesting habits: mud-nesters, burrowers, and cavity adopters (Winkler & Sheldon 1993).



Fairy Martin, *Petrochelidon ariel*. Eastlakes, New South Wales, Australia. © Nevil Lazarus.



Lesser Striped Swallow, *Cecropis abyssinica*. Kruger NP, South Africa. © Dubi Shapiro.

*PSEUDOCHELIDON*
2 species



*P. eurystomina*
African River Martin

*CHERAMOECA*
1 species



*C. leucosterna*
White-backed Swallow

*PSEUDHIRUNDO*
1 species



*P. griseopyga*
Gray-rumped Swallow

*PSALIDOPROCNE*
5 species



*P. albiceps*
White-headed Saw-wing

*DELICHON*
3 species



*D. urbicum*
Northern House Martin

*PETROCHELIDON*
11 species



*P. fulva*
Cave Swallow

*CECROPIS*
7 species



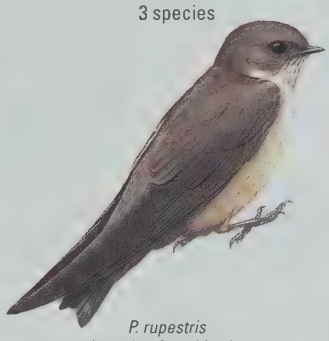
*C. senegalensis*
Mosque Swallow

*HIRUNDO*
14 species



*H. rustica*
Barn Swallow

*PTYONOPROGNE*
3 species



*P. rupestris*
Eurasian Crag Martin

*NEOPHEDINA*
1 species



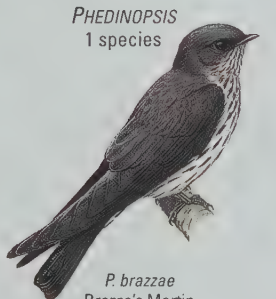
*N. cincta*
Banded Martin

*PHEDINA*
1 species



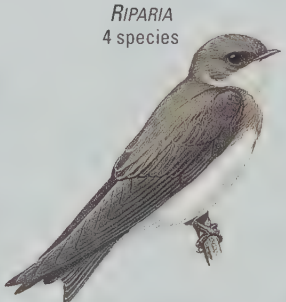
*P. borbonica*
Mascarene Martin

*PHEDINOPSIS*
1 species



*P. brazzae*
Brazza's Martin

*RIPARIA*
4 species



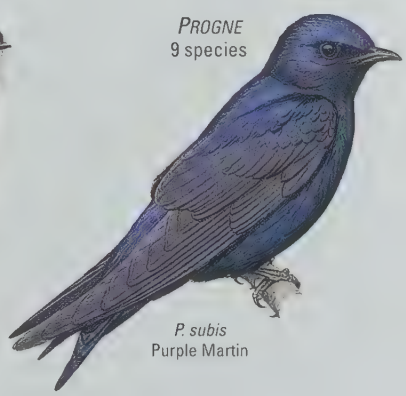
*R. riparia*
Collared Sand Martin

*TACHYCINETA*
9 species



*T. albiventer*
White-winged Swallow

*PROGNE*
9 species



*P. subis*
Purple Martin

*STELGIDOPTERYX*
2 species



*S. ruficollis*
Southern Rough-winged Swallow

*PYGOCHELIDON*
2 species



*P. cyanoleuca*
Blue-and-white Swallow

*ALOPOCHELIDON*
1 species



*A. fucata*
Tawny-headed Swallow

*ATTICORA*
3 species



*A. fasciata*
White-banded Swallow

*OROCHELIDON*
3 species



*O. flavipes*
Pale-footed Swallow

# PYCNONOTIDAE
## Bulbuls

31 genera • 131 species

**Related Families** Likely Cisticolidae (cisticolas and allies), and possibly Hirundinidae (swallows and martins), Scotocercidae (bush warblers), Aegithalidae (long-tailed tits), Phylloscopidae (leaf warblers), Sylviidae (sylviid warblers and parrotbills), Leiothrichidae (laughing-thrushes and allies), Zosteropidae (white-eyes and yuhinas)

**Similar Birds** Tyrant flycatchers (Tyrannidae), babblers (Timaliidae, Leiothrichidae, Pellorneidae), honeyeaters (Meliphagidae), figbirds (Oriolidae)

**Description**

- Plumage generally brown, olive, yellow, or black with contrasting patches of these plus white or red around undertail and (often-crested) head
- Wings rounded; tail medium to (most commonly) long, with long, fluffy rump feathers
- Body size medium, cylindrical ovoid, with upright posture
- Bill medium length, straight, slightly inflated
- Head small to medium, with hair-like nape feathers and rictal bristles in some; neck short, thick
- Legs medium-short; feet small
- Sexes similar

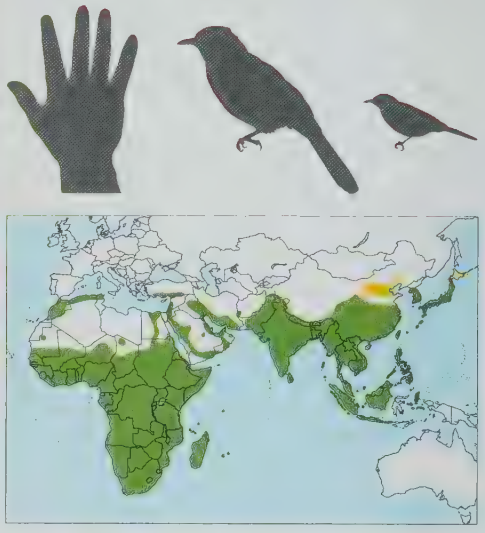
**Habitat** Bulbuls live in a variety of habitats, ranging from dense rainforest to open scrub habitat and arid savanna.

**Food** Pycnonotids feed on a diverse assortment of foods, including fruits, seeds, buds, leaves, nectar, invertebrates, small vertebrates, and carrion. Many species consume large amounts of fruit, gleaning it from branches. Insect prey may either be gleaned from branches or caught during sallying flights. Large insects and small vertebrates are beaten before being swallowed whole. Some African genera, including *Bleda* and *Criniger*, are primarily insectivorous and feed in the understory of forests.

**Breeding** Most pycnonotids are monogamous with biparental care, although it appears likely that some species are cooperative breeders. Only one species, the Yellow-whiskered Greenbul *Eurillas latirostris*, is known to be polygynous with lek-like male aggregations and all-female parental care in some populations. Nests are typically open cups built of grasses, rootlets, leaves, and other plant materials, and are often



Stripe-throated Bulbul, *Pycnonotus finlaysoni*. Orchard Mile, near Kaeng Krachan NP, Thailand. © Alex Vargas.



These mid-sized passerines are common fixtures of woodlands, gardens, and forests of Africa and southern Asia. Often rather plain, with longish tails in all and crests or small splashes of color around the face or in the undertail coverts in many, bulbuls are frequently more heard than seen. Their name derives from the Persian word for nightingale (an unrelated species), and though they are known for their bubbly songs, not all bulbuls sing with the musicality that their name might suggest. A great many have an irresistible fondness for fruit, and fruiting trees in these areas are often bustling with pycnonotids of several species, challenging the identification powers of all but the most experienced observers.



Brown-eared Bulbul, *Hypsipetes amaurotis*. Funagawa Dam, Okinawa, Japan. © Ian Davies.

lined with finer materials such as hair and soft plant fibers. Nests are placed in bushes or trees, often where two branches meet. Females lay 1 to 5 eggs. Nest-building and incubation are by both sexes or, more commonly, by the female alone. Incubation takes 11 to 14 days. Both male and female (and helpers if present) feed the young once they hatch, and the chicks leave the nest after 9 to 21 (most commonly 12 to 16) days there. The fledglings rarely are fed for as long as a month after fledging.

**Conservation** Habitat destruction is the primary threat to 27 species (21%) of pcynonotids (15 NT, 9 VU, 2 EN, 1 CR). The critically endangered Liberian Greenbul *Phyllastrephus leucolepis*, described in 1985, is known only from a small patch of forest in Liberia, which is still threatened by logging and conversion to agriculture. The endangered Streak-breasted Bulbul *Ixos siquijorensis* and Prigogine's Greenbul *Chlorocichla prigoginei* are range-restricted species whose small populations are under great pressure from deforestation and habitat conversion to agriculture. Many bulbuls are trapped for the cage-bird trade, and populations of the vulnerable Straw-headed Bulbul *Pycnonotus zeylanicus* have been dramatically affected by this reduction in number of adults in the wild.

**Relationships** The bulbuls are part of the large sylvioid radiation of oscine passerines. The family-level relationships of groups that are close to Pycnonotidae are not yet fully resolved. Studies with good taxonomic sampling among potential sister taxa sometimes indicate polytomies with large numbers of other sylvioid families (Johansson *et al.* 2008b, Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a). Two studies suggest a sister relationship with Cisticolidae (Gelang *et al.* 2009, Olsson *et al.* 2013); another suggests Pycnonotidae as sister to a clade that includes Hirundinidae, Scotocercidae, Aegithalidae, and Phylloscopidae (Alström *et al.* 2006); and a third indicates Pycnonotidae as sister to a clade made up of Sylviidae, Leiothrichidae, Zosteropidae, and Cisticolidae (Beresford *et al.* 2005). Clearly, the sister relationships of Pycnonotidae are not yet well resolved.



Red-eyed Bulbul, *Pycnonotus brunneus*. Tawau Hill Park, Sabah, Borneo. © Drew Fulton.



Red-eyed Bulbul, *Pycnonotus brunneus*. Danum Valley, Sabah, Borneo. © Con Foley.



Black-crested Bulbul, *Pycnonotus melanicterus*. Kaeng Krachan NP, Thailand. © Con Foley.

*Stelgidillas*
1 species



*S. gracilirostris*
Slender-billed Greenbul

*Calyptocichla*
1 species



*C. serinus*
Golden Greenbul

*Andropadus*
1 species



*A. importunus*
Sombre Greenbul

*Neolestes*
1 species



*N. torquatus*
Black-collared Bulbul

*Bleda*
4 species



*B. syndactylus*
Red-tailed Bristlebill

*Atimastillas*
1 species



*A. flavicollis*
Yellow-throated Greenbul

*Ixonotus*
1 species



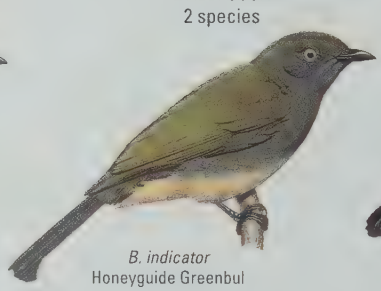
*I. guttatus*
Spotted Greenbul

*Thescelocichla*
1 species



*T. leucopleura*
Swamp Palm Bulbul

*Baeopogon*
2 species



*B. indicator*
Honeyguide Greenbul

*Chlorocichla*
5 species



*C. simplex*
Simple Greenbul

*Arizelocichla*
5 species



*A. nigriceps*
Eastern Mountain Greenbul

*Eurillas*
5 species



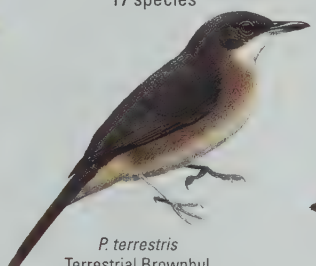
*E. latirostris*
Yellow-whiskered Greenbul

*Criniger*
5 species



*C. barbatus*
Western Bearded Greenbul

*Phyllastrephus*
17 species



*P. terrestris*
Terrestrial Brownbul

*Pyrrhurus*
1 species



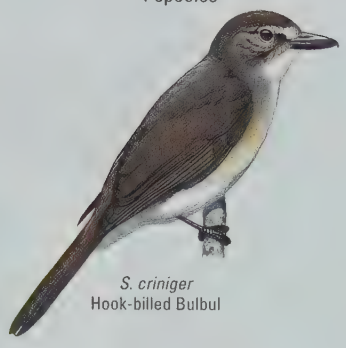
*P. scandens*
Leaf-love

*Tricholestes*
1 species



*T. criniger*
Hairy-backed Bulbul

*Setornis*
1 species



*S. criniger*
Hook-billed Bulbul

*Alophoixus*
6 species



*A. flaveolus*
White-throated Bulbul

*Iole*
4 species



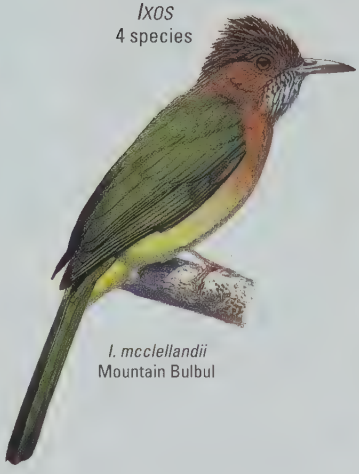
*I. propinqua*
Gray-eyed Bulbul

*Hemixos*
3 species



*H. castanonotus*
Chestnut Bulbul

*Ixos*
4 species



*I. mcclellandii*
Mountain Bulbul

*Hypsipetes*
12 species



*H. ganeesa*
Square-tailed Black Bulbul

*Spizixos*
2 species



*S. semitorques*
Collared Finchbill

*Pycnonotus*
37 species



*P. jocosus*
Red-whiskered Bulbul

*Euptilotus*
1 species



*E. eutilotus*
Puff-backed Bulbul

*Microtarsus*
1 species



*M. melanoleucos*
Black-and-white Bulbul

*Brachypodius*
3 species



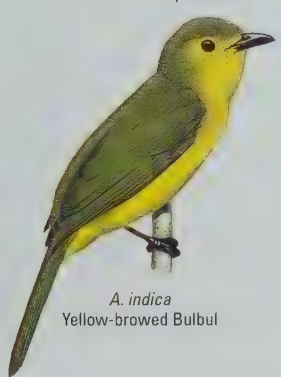
*B. atriceps*
Black-headed Bulbul

*Poliolophus*
1 species



*P. urostictus*
Yellow-wattled Bulbul

*Acritillas*
1 species



*A. indica*
Yellow-browed Bulbul

*Thapsinillas*
2 species



*T. affinis*
Southern Golden Bulbul

*Cerasophila*
1 species



*C. thompsoni*
White-headed Bulbul

# PHYLLOSCOPIDAE
## Leaf Warblers

4 genera • 70 species

**Related Families** Aegithalidae (long-tailed tits), Scotocercidae (bush warblers)

**Similar Birds** Other warblers (Macrosphenidae, Acrocephalidae, Scotocercidae, Acanthizidae, Parulidae), kinglets (Regulidae)

**Description**
- Plumage predominantly yellow or green, most with paler underparts, with distinct crown-stripe or eye-ring in most
- Wings long and pointed, especially in long-distance migrants; tail medium length, squared
- Body very small to small, cylindrical ovoid, with hunched horizontal posture
- Bill short, thin
- Head small; neck short
- Legs medium-long; feet small
- Sexes similar

**Habitat** The leaf warblers are denizens of diverse habitats, including wet tropical forest, bamboo forest, brushy scrub, gardens, and northern deciduous and boreal forests.

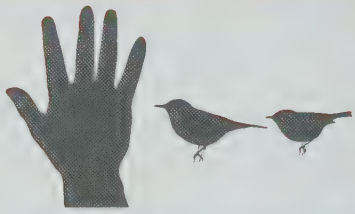
**Food** Phylloscopids are primarily insectivorous, obtaining prey by gleaning, hover-gleaning, or flycatching.

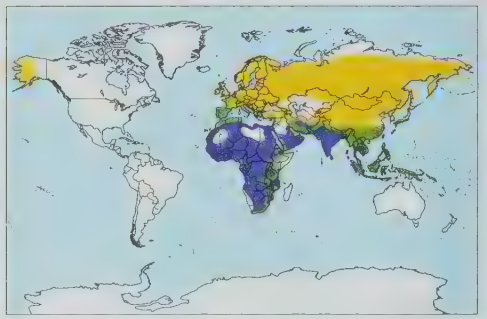
**Breeding** The leaf warblers appear to be monogamous with biparental care, although some species may be polygynous, mating with a second female on a separate territory. Their nests are typically domed structures built mainly of grass, leaves, and lichens, and are often lined with fine grass. Leaf warblers typically place their nest on or near the ground in a well-concealed location. Females lay 2 to 9 eggs. Nest-building and incubation is by both sexes or by the female alone, and both male and female feed the chicks. Incubation takes 13 to 14 days, and the chicks leave the nest after 10 to 22 days. They appear to be fed by parents for up to a month after fledging.

**Conservation** Habitat loss is the primary conservation concern for the four species (6%) that are at risk (1 NT, 3 VU). The Kolombangara Leaf Warbler *Seicercus amoenus*, Hainan Leaf Warbler *Phylloscopus hainanus*, and Izu Leaf Warbler *P. ijimae* are considered vulnerable, all of them restricted-range species on islands. In addition to the special risk attached to small populations sizes, there is also concern about



Wood Warbler, *Rhadina sibilatrix*. Białowieza, Poland. © Mark A. Chappell.





This family, recently split from the once-enormous Sylviidae, contains a number of very small songbirds that forage with restless motion on or just above branches and leaves for small insects, often flicking their wings and using their fine, thin bills combined with rapid hops and hovers to capture their prey. Most have fairly unprepossessing plumage: olive backs, yellow to light gray undersides, and very often some wing bars and a striped or chestnut crown. Their songs, like their plumage, tend to be fairly simple—largely a jumble of thin warbles, buzzes, or repeated syllables. Though they spend most of their time foraging in tree crowns, they generally place their nests low, near, or even on the ground.



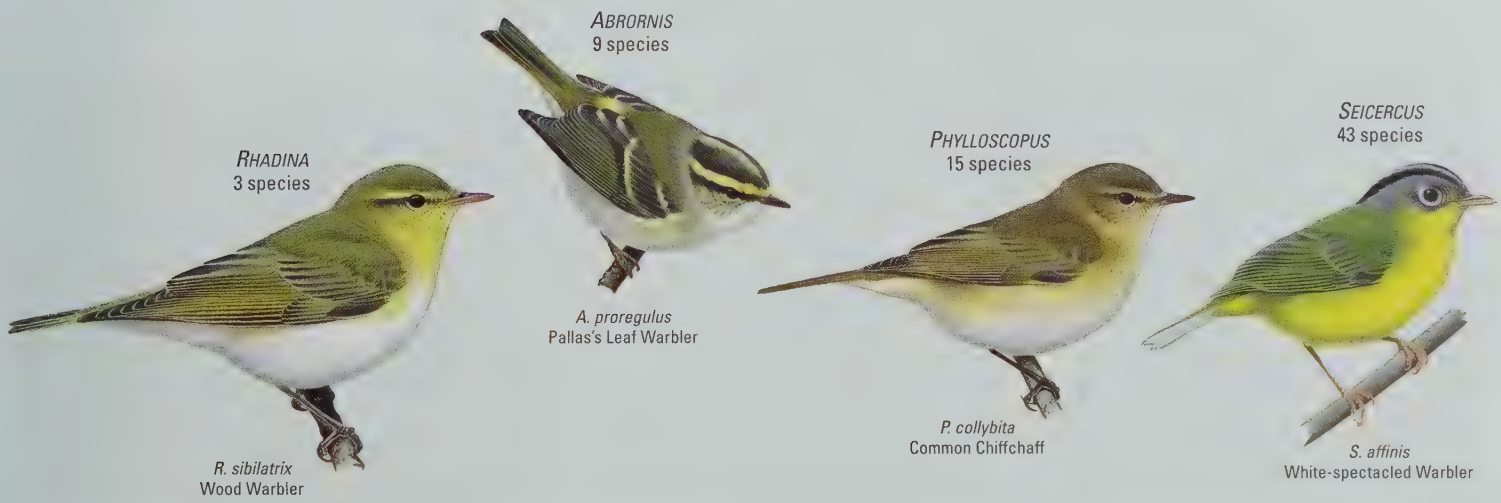
Chestnut-crowned Leaf Warbler, *Seicercus castaniceps*. Fraser's Hill, Pahang, Malaysia. © Con Foley.

mortality related to pesticide use on the wintering grounds of *P. ijimae.*

**Relationships** Phylloscopidae is part of the superfamily Sylvioidea of oscine passerines. This family was traditionally placed in the large family Sylviidae *sensu lato.* Recent molecular phylogenetic studies, however, suggest that Phylloscopidae is a distinct clade within the larger Sylvioidea. Within this broader radiation, Phylloscopidae is in a clade with Aegithalidae and Scotocercidae (Gelang *et al.* 2009, Olsson *et al.* 2013), and the relationships among these three families vary slightly among studies. Phylloscopidae could be sister to a clade that is Aegithalidae and Scotocercidae taken together (Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a), or sister to Aegithalidae and then together sister to Scotocercidae (Johansson *et al.* 2008b) or vice versa (Olsson *et al.* 2013).



Willow Warbler, *Phylloscopus trochilus.* Bug River, Poland. © Paweł Wacławik.



# SCOTOCERCIDAE
## Bush Warblers

12 genera • 36 species

**Related Families** Aegithalidae (long-tailed tits); Phylloscopidae (leaf warblers)

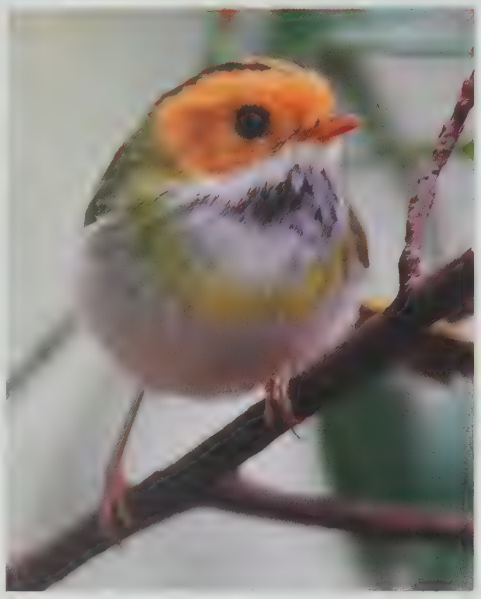
**Similar Birds** Warblers (Scotocercidae, Sylviidae, Phylloscopidae, Acrocephalidae, Cisticolidae)

**Description**
- Plumage generally dark brown above and paler below, with bold supercilium and yellow underparts in many species
- Wings rounded; tail medium to long, rounded, graduated
- Body small, cylindrical ovoid, with hunched posture
- Bill straight, thin
- Head medium-sized; neck short, thick
- Legs medium-long; feet small
- Sexes generally similar

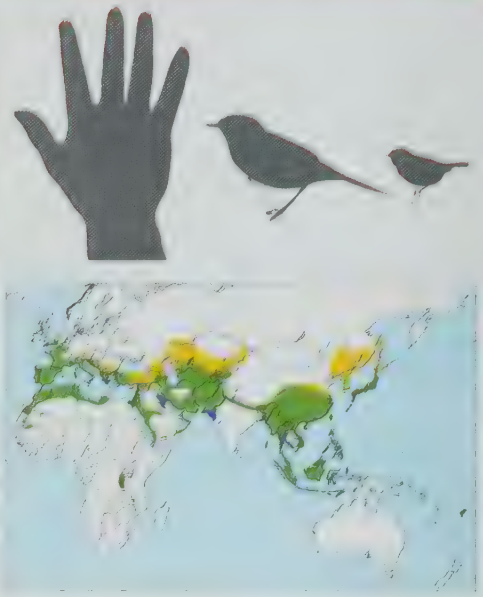
**Habitat** The bush warblers live in a wide range of forested habitats, although they generally show a strong preference for areas with dense undergrowth.

**Food** Although few studies have investigated the diet of the scotocercids, they appear to feed mostly on insects and other invertebrates, especially spiders and snails, and they take seeds at times when insects are scarce. Many species appear to startle insects by flicking wings and fanning tail. Some *Cettia* species in marshy habitats eat many aquatic insects. Most species are very shy skulkers in dense vegetation, but the Broad-billed Warbler *Tickellia hodgsoni* and *Abroscopus* species flycatch and hover-glean in trees and on edges of understory.

**Breeding** The breeding biology of the bush warblers is not well studied. In most genera, birds are presumed to be monogamous with biparental care and cooperative breeding at least in *Urosphena* and *Erythrocercus*. *Cettia* species have a good deal of flexibility in the mating system, and at least one species is facultatively polygynous. Scotocercid nests are either cup nests of grass or twig balls with a side entrance near the top. Nests are decorated with moss, rootlets, bamboo leaves, other plant material, or animal hair. The Tit Hylia *Pholidornis rushiae* is distinctive in building a ball-shaped nest of felted soft



Rufous-faced Warbler, *Abroscopus albogularis*. Taiming, Jiangxi, China. © Tang Jun



Most bush warblers are secretive brown birds, adept at clambering through thick shrubbery, and, though vocal, some will not emerge even in response to playback. Although some genera forage actively in mid and upper levels of vegetation, most forage near the ground and many will not flush if alarmed, instead escaping by walking or scurrying away like a mouse. The yellias and stubtails are the most adept at moving through dense vegetation seemingly without disturbing it at all, and with their short tails, relatively long legs, and bounding gait they look like tiny rats making their getaway.



Japanese Bush Warbler, *Horornis diphone*. Tomi-yama Peninsula, Wakayama, Japan. © Ian Davies

plant materials with its entrance spout pointing vertically downward. Nests are placed either on the ground or in a dense, low bush or bamboo thicket. Females lay 1 to 6 eggs in a clutch. Nest-building, incubation, and feeding the chicks is the responsibility of females alone in some species, and of both parents in others. Incubation takes 13 to 17 days. Chicks fledge after 13 to 16 days in the nest. Interestingly, in *Cettia cetti* incubation and chick provisioning are by the female alone until the chicks fledge, at which time the male helps provision the fledglings for up to a month after they leave the nest.

**Conservation** Habitat loss has put two scotocercid species (6%) at risk (2 NT). The Tanimbar Bush Warbler *Cettia carolinae* and Odedi Bush Warbler *C. haddeni* are both range-restricted island species, and are therefore particularly vulnerable to habitat loss. For decades the latter species was known to exist only by voice; it was not successfully captured and described until 2000.

**Relationships** Scotocercidae is part of the sylvioid radiation of the oscine passerines. Prior to extensive phylogenetic analysis of these Old World "warblers," the members of this family were considered to be part of the very large Sylviidae *sensu lato*. Scotocercidae appears to form a well-supported group with Aegithalidae and Phylloscopidae (Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Olsson *et al.* 2013). The relationships between these three families vary among studies, although it appears that Scotocercidae is most likely sister to Aegithalidae, and together these are sister to Phylloscopidae (Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a). Treatment of this family has varied, with some authors recognizing three separate families. This treatment would leave a monotypic Scotocercidae, Erythrocercidae, and a more diverse Cettiidae (Fregin *et al.* 2012, Alström *et al.* 2013a). Because these three groups always group together with strong support, we choose to recognize a single family with three distinct subfamilies, with the name Scotocercidae having priority. Note that the Mountain Tailorbird *Phyllergates cucullatus* has often been treated as a member of the genus *Orthotomus* (Cisticolidae), but studies by Alström *et al.* (2006) clearly place it with scotocercids as defined here instead. *Hylia* and *Pholidornis*, sometimes split into their own family, Hyliidae (Fregin *et al.* 2012, Alström *et al.* 2013a), are here treated as part of Scotocercidae, but their affinities remain uncertain (Alström *et al.* 2011a, Fregin *et al.* 2012, Alström *et al.* 2013a).



Chestnut-headed Tesia, *Cettia castaneocoronata*. Doi Ang Khang, Thailand. © Michael Gillam.



Mountain Tailorbird, *Phyllergates cucullatus*. Fraser's Hill, Pahang, Malaysia. © Con Foley.



Green Hylia, *Hylia prasina*. Kakum NP, Ghana. © Ken Behrens.

## Subfamily ERYTHROCERCINAE

*ERYTHROCERCUS*
3 species



*E. livingstonei*
Livingstone's Flycatcher

## Subfamily SCOTOCERCINAE

*SCOTOCERCA*
1 species



*S. inquieta*
Streaked Scrub-warbler

## Subfamily CETTIINAE

*TESIA*
4 species



*T. cyaniventer*
Gray-bellied Tesia

*CETTIA*
4 species



*C. cetti*
Cetti's Warbler

*HEMITESIA*
2 species



*H. neumanni*
Neumann's Warbler

*UROSPHENA*
3 species



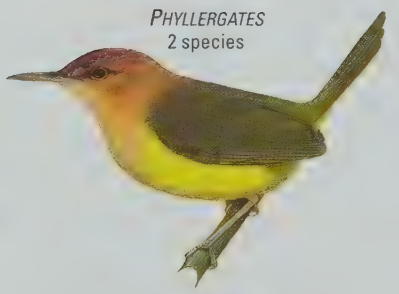
*U. squameiceps*
Asian Stubtail

*ABROSCOPUS*
3 species



*A. schisticeps*
Black-faced Warbler

*PHYLLERGATES*
2 species



*P. heterolaemus*
Rufous-headed Tailorbird

*TICKELLIA*
1 species



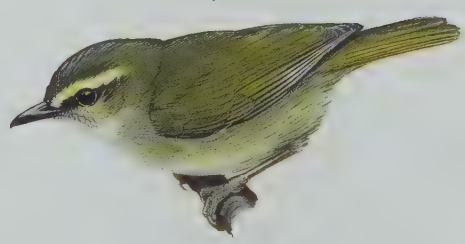
*T. hodgsoni*
Broad-billed Warbler

*HORORNIS*
11 species



*H. diphone*
Japanese Bush Warbler

*HYLIA*
1 species



*H. prasina*
Green Hylia

*PHOLIDORNIS*
1 species



*P. rushiae*
Tit-hylia

Passeriformes, Sylvioid Oscines

# AEGITHALIDAE
## Long-tailed Tits

4 genera • 13 species

**Related Families** Scotocercidae (bush warblers), Phylloscopidae (leaf warblers)

**Similar Birds** Tits and chickadees (Paridae), penduline-tits (Remizidae), kinglets (Regulidae), Bearded Reedling (Panuridae)

**Description**
- Plumage generally black, brown, and white; *Leptopoecile* tit-warblers more colorful, with patches of blues and pinks
- Wings short, rounded; tail medium-long to very long, narrow
- Body very small, ovoid, compact
- Bill short, deep
- Head large; neck short, thick
- Legs medium-short; feet small
- Sexes generally similar

**Habitat** Aegithalids live in a range of habitats from arid scrub to dense temperate forests, as well as surrounding edge habitats.

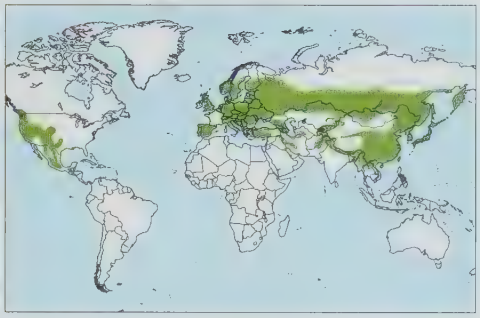
**Food** The bushtits and long-tailed tits feed primarily on insects and other invertebrates, eating fruit and seeds occasionally when insects are scarce. Aegithalids forage by gleaning insects from leaves and branches, often hanging upside down beneath branches and leaf clusters in pursuit of their food.

**Breeding** The basic mating and social system for Aegithalids appears to be monogamy with biparental care, but quite a few species are cooperative breeders at times. The Bushtit *Psaltriparus minimus* has a very flexible mating system (at various times polygynous, polyandrous, or polygynandrous) that seems to be driven by failed breeders joining other groups and various members being allowed into both parental and reproductive roles in the new group. Aegithalid nests are either small globes placed on supporting branches (in *Aegithalos* and *Leptopoecile*) or gourd-shaped and pendant from overhanging branches (in *Psaltriparus* and *Psaltria*), all made of twiglets, moss, and lichen, and bound together with spiderwebs and lined with soft plant down, hair, or feathers. Females lay 2 to 15 eggs, with larger clutches in more northerly regions. In some species, both male and female, and helpers when present, participate in all aspects of parental care, including nest-building, incubation, and feeding young; however, incubation



Long-tailed Tit, *Aegithalos caudatus*. Delft, The Netherlands. © Reinder Doeleman.





These spunky, diminutive birds, known for their outsized tails and relatively large heads, use their short conical bills to extract insects from small crevices in buds and bark. Foraging in groups, they are constantly on the move through forest and woodland vegetation, keeping in touch through a series of high lispy or tinkly bounding trills. Most species are cooperative breeders, building globular or pendant nests of moss and lichens knit together by spiderwebs and, often, stuffed with copious numbers of feathers from larger species of birds. Those species living in colder climes often save energy by huddling together through the night, a dozen or so to a branch.



Sooty Tit, *Aegithalos fuliginosus*. Jiuzhaigou Natural Reserve, Sichuan, China. © Tang Jun.

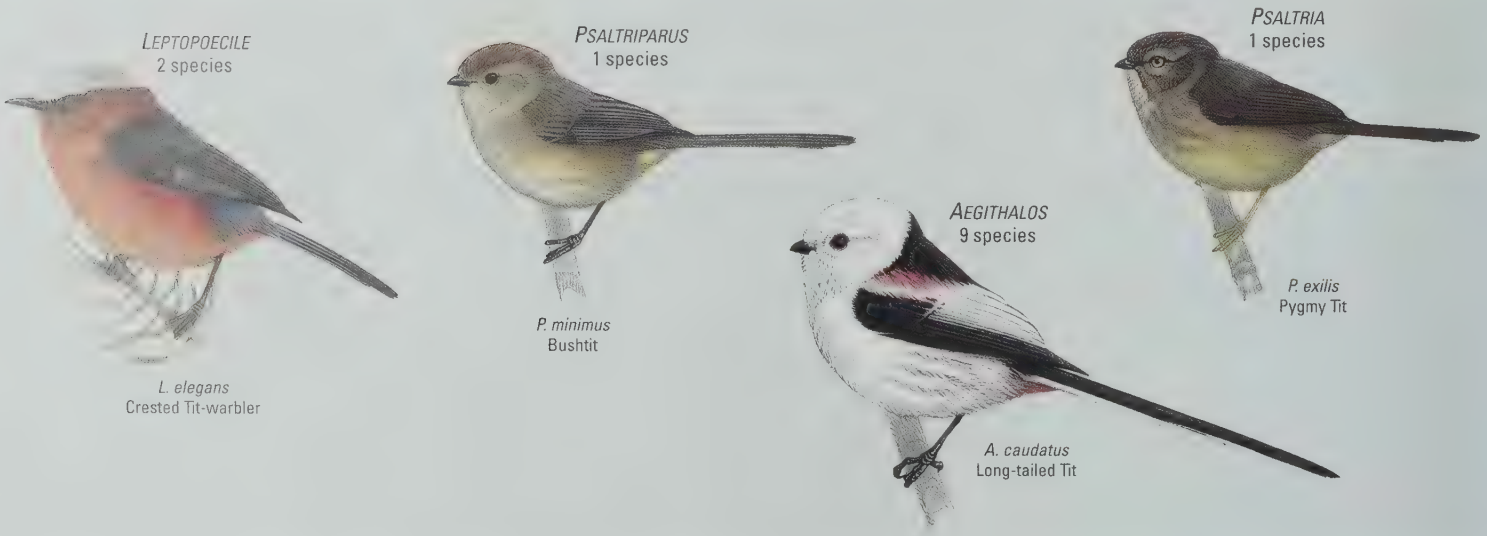
in other species is by the female alone. Incubation takes 12 to 18 days; nestlings are in the nest for 14 to 18 days, and fledglings are fed for two weeks or so after leaving the nest.

**Conservation** No species of aegithalid faces any immediate conservation concern.

**Relationships** Aegithalidae is part of the sylvioid radiation of oscine passerines. In the past, these small birds have been placed with the tits and chickadees and penduline-tits within a more inclusive Paridae (Harrap & Quinn 1995). However, molecular phylogenetic studies now show that Aegithalidae and Paridae are only distantly related within Sylvioidea. Aegithalidae forms a well-supported clade with Phylloscopidae and Scotocercidae (Beresford *et al.* 2005, Alström *et al.* 2006, Johansson *et al.* 2008b, Olsson *et al.* 2013). Within this small clade, Aegithalidae is most likely sister to Scotocercidae (Alström *et al.* 2011a, Irestedt *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a), though it has sometimes been found closer to Phylloscopidae (Johansson *et al.* 2008b) and sometimes as sister to both families in the group (Olsson *et al.* 2013). Within Aegithalidae, the two colorful *Leptopoecile* species are sister to all other members of the family. Among the rest of the species, *Psaltriparus* from North America is in turn sister to the *Aegithalos* species of the Old World (Päckert *et al.* 2010).



Bushtit, *Psaltriparus minimus*. Riverside, California, USA. © Mark A. Chappell.



Passeriformes, Sylvioid Oscines

# SYLVIIDAE

## Sylviid Warblers and Parrotbills

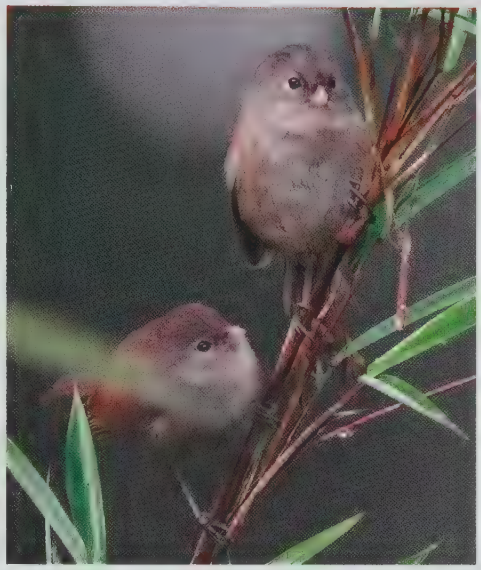
19 genera • 65 species

**Related Families** Zosteropidae (white-eyes and yuhinas), Timaliidae (tree babblers), Pellorneidae (ground babblers and allies), Leiothrichidae (laughing-thrushes and allies)

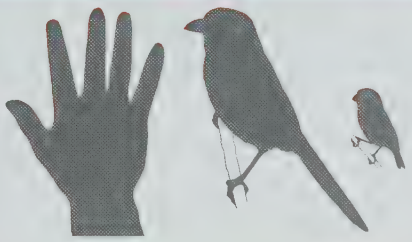
**Similar Birds** Old World warblers (Acrocephalidae, Phylloscopidae, Locustellidae), babblers (Timaliidae), gnatcatchers (Polioptilidae)

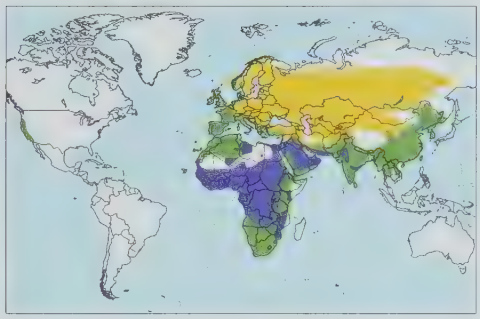
**Description**

- Plumages vary from somber earth tones to strong patterns in black, gray, and white, or yellow and/or rufous; *Myzornis* green with red highlights
- Wings rounded; tail ranging from medium-long to long, usually graduated at least to some extent
- Body small, cylindrical ovoid, somewhat elongate
- Bill medium-short, generally straight and thin in most; parrotbills with bill deeper than long, and with curved cutting edge in most
- Head small to medium; neck thick and short to medium
- Legs and feet medium
- Sexes generally similar; males more brightly colored in a few



Gray-hooded Parrotbill, *Sinosuthora zappeyi*. Wawu Shan, Sichuan, China. © Christian Artuso.





**Habitat** The sylviids live in a wide array of habitats, from arid scrub and riparian thickets to temperate forest, rainforest, and bamboo scrub.

**Food** Sylviid warblers are primarily insectivorous, mostly gleaning prey from leaves and branches; parrotbills, as well as *Lioptilus*, *Parophasma*, and *Chamaea* in some seasons, feed more on fruits, seeds, leaf buds, and flowers than on insects. Various sylviids occasionally take nectar and tree sap. Parrotbills use their substantial bills to crack seeds, and they and *Chrysomma* strip leaf bases and bamboo canes in search of grubs. Parrotbills most often forage through dense vegetation in groups, with individuals covering the habitat in a series of zigzag hops.

**Breeding** The sylviids are monogamous with biparental care. Nests are fairly similar across the family, being open cups, sometimes quite deep and, at least in *Lioparus* and *Myzornis*, domed with a side entrance. Nests are built of leaf skeletons, reeds, grasses, bamboo leaves, bark, leaves, and very often moss, often put together with and plastered outside with spiderwebs, with a lining of finer vegetation, hair, or feathers. Some parrotbill nests are of a clear yellow color that renders them highly cryptic in their deep grass-bed habitat. Nests are constructed

At one point containing a substantial proportion of the landbirds of Eurasia, Sylviidae has been pruned back by modern molecular work to a core trunk with two main branches containing seemingly disparate birds: The first branch contains the Eurasian warblers in the genus *Sylvia*, with plumages mostly of gray, brown, or white. The other branch contains the *Paradoxornis* parrotbills, including one species that is the only passerine to have only three toes! The Wrentit, the only representative of this family in the Western Hemisphere, has only recently been recognized as a sylviid, as has *Myzornis*, a green and red jewel accented with black from the wet mountains of Asia—a seeming stretch to accommodate in any sylvioid family.



Dartford Warbler, *Curruca undata*. Norfolk, United Kingdom. © Nik Borrow.

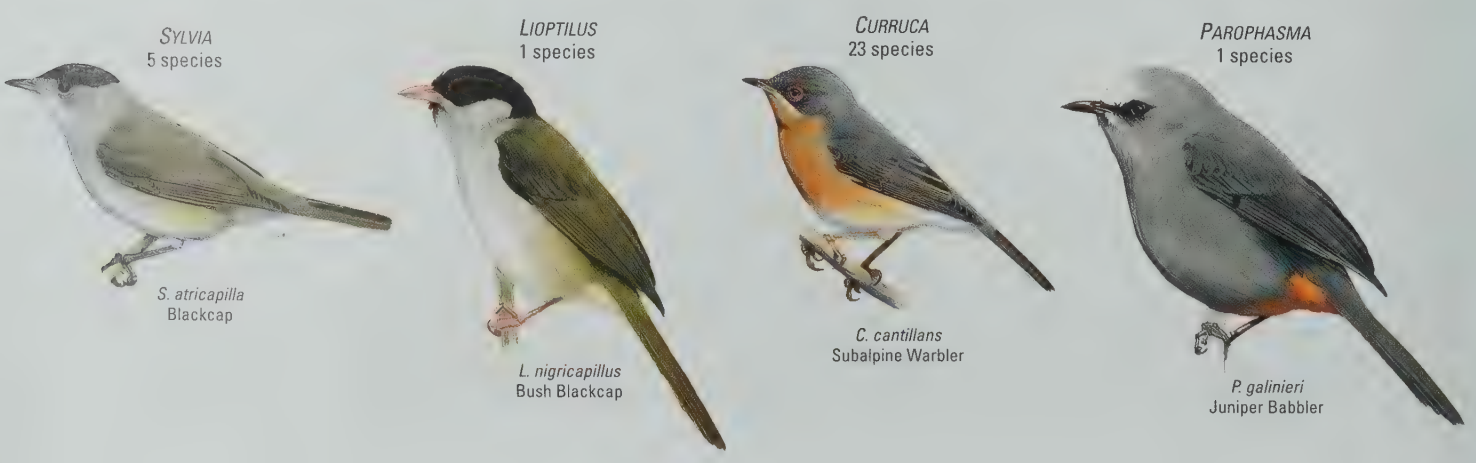


Sardinian Warbler, *Curruca melanocephala*. Étang de Biguglia, Corsica, France. © Ian Davies.

in a shrub, in bamboo, in reeds, or in a tree. Parrotbill nests are typically placed low, whereas nest placement in the sylviid warblers is more variable. Females lay 2 to 8 eggs, with clutches of 3 to 6 most frequent. Both the male and female are active in nest construction, incubation, and feeding chicks. Incubation takes 10 to 18 days. The nestling period is 11 to 19 days (average 15 days), and young stay in the family party for 18 to 41 (typically 30) days after fledging; as early as 30 days of age the young may form a lasting pair bond with an older individual, staying on territory until the next breeding season 11 months later.

Conservation Habitat destruction is the primary threat facing sylviids. Nine species (14%) are of conservation concern (4 NT, 5 VU). The vulnerable Yemen Warbler *Curruca buryi* is limited to a small area of montane forests on the western border of Saudi Arabia and Yemen where harvesting of the habitat and encroachment of livestock pose grave threats. The vulnerable Gray-hooded Parrotbill *Sinosuthora zappeyi* and Rusty-throated Parrotbill *S. przewalskii* are both restricted to a few high-elevation sites in China where loss of their open forest and scrub-bamboo habitat to development and agriculture is coupled with the mass-flowering and death of large bamboo stands. The two other vulnerable sylviids, Black-breasted Parrotbill *P. flavirostris* and Jerdon's Babbler *Chrysomma altirostre*, have been restricted largely to preserves by the harvesting of reeds and grassland in their tiny and disjunct ranges in southern Asia. Even in those areas, their habitat is under siege from the dual threat of fires and unpredictable flooding or draining of their wetland habitat.

Relationships Sylviidae is part of the superfamily Sylvioidea of oscine passerines. The traditional Sylviidae, which previously included all of the Old World "warblers," has had a convoluted taxonomic history, and it traditionally included groups now assigned to separate families, including Phylloscopidae, Locustellidae, Scotocercidae, Acrocephalidae, and even Regulidae and Polioptilidae. As now recognized, Sylviidae is a much smaller family, which appears to be sister to a well-supported group of families of "babblers," including Zosteropidae, Timaliidae, Pellorneidae, and Leiothrichidae (Cibois 2003, Alström *et al.* 2006, Johansson *et al.* 2008b, Gelang *et al.* 2009, Irestedt *et al.* 2011, Fregin *et al.* 2012, Moyle *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013). One of the most interesting aspects of this split is that birds called fulvettas are now scattered across three families, with the genera *Lioparus* and *Fulvetta* in Sylviidae, *Schoeniparus* in Pellorneidae, and *Alcippe* in Leiothrichidae (Cibois 2003, Moyle *et al.* 2012).



*Myzornis*
1 species



*M. pyrrhoura*
Fire-tailed Myzornis

*Moupinia*
1 species



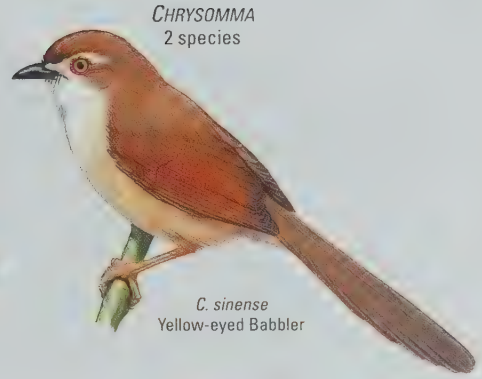
*M. poecilotis*
Rufous-tailed Babbler

*Lioparus*
1 species



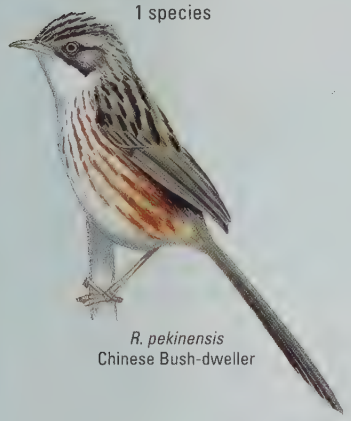
*L. chrysotis*
Golden-breasted Fulvetta

*Chrysomma*
2 species



*C. sinense*
Yellow-eyed Babbler

*Rhopophilus*
1 species



*R. pekinensis*
Chinese Bush-dweller

*Fulvetta*
8 species



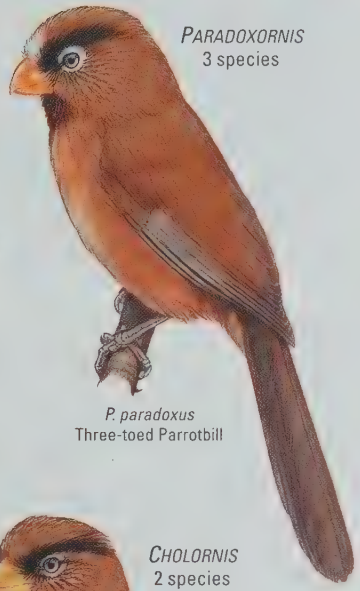
*F. vinipectus*
White-browed Fulvetta

*Chamaea*
1 species



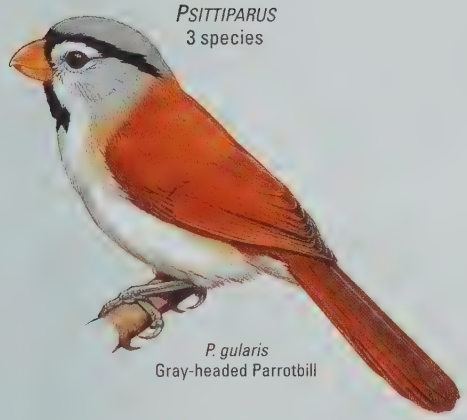
*C. fasciata*
Wrentit

*Paradoxornis*
3 species



*P. paradoxus*
Three-toed Parrotbill

*Psittiparus*
3 species



*P. gularis*
Gray-headed Parrotbill

*Conostoma*
1 species



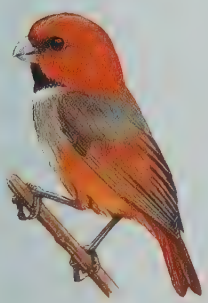
*C. aemodium*
Great Parrotbill

*Cholornis*
2 species



*C. unicolor*
Brown Parrotbill

*Neosuthora*
1 species



*N. davidiana*
Short-tailed Parrotbill

*Suthora*
3 species



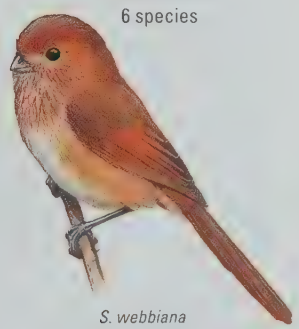
*S. nipalensis*
Black-throated Parrotbill

*Chleuasicus*
1 species



*C. atrosuperciliaris*
Lesser Rufous-headed Parrotbill

*Sinosuthora*
6 species



*S. webbiana*
Vinous-throated Parrotbill

# ZOSTEROPIDAE

## White-eyes and Yuhinas

12 genera • 120 species

**Related Families** Timaliidae (tree babblers), Pellorneidae (ground babblers and allies), Leiothrichidae (laughing-thrushes and allies)

**Similar Birds** Warblers (Cisticolidae, Locustellidae, Parulidae), vireos (Vireonidae)

**Description**

- White-eyes generally yellow or olive, with bold white eye-ring; yuhinas generally earth-toned brown, white, or gray, with a crest
- Wings fairly short to medium, rounded; tail medium length
- Body small, cylindrical ovoid, compact
- Bill short to medium, thin, pointed, slightly decurved in some
- Head medium; neck medium-short, thick
- Legs and feet medium length
- Sexes similar

**Habitat** White-eyes and yuhinas are found in a wide variety of habitats, from dense forest to arid shrubland. Capable dispersers to new habitats, many species are frequently encountered in city parks.

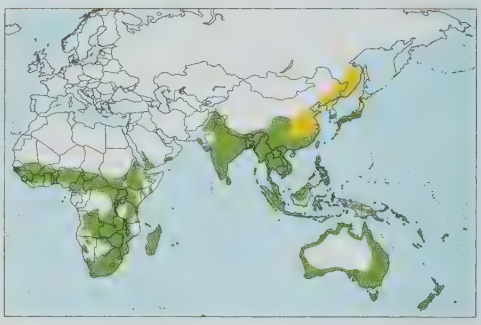
**Food** Zosteropids feed mostly on insects and spiders and small snails, which are taken by gleaning from leaves and branches. However, especially when insects are scarce, fruit, seeds, nectar, and plant sap play an important role in the diet of many species, most or all of which have brush-tipped tongues to help them drink nectar.

**Breeding** Zosteropids are generally monogamous with biparental care. Some yuhinas are social breeders, with multiple pairs laying their eggs in the same nest. Even in these social nests, pairs are generally monogamous. White-eyes construct open cup nests that are suspended between the forked ends of a twig or branch. Some yuhinas build a domed nest, others a flimsy cup, placed in the crown of a tree or in the fork of a branch or suspended beneath a branch. Zosteropid nests are constructed of twiglets, moss, lichen, leaves, grass, and root fibers, and lined with fine rootlets and stems. They often incorporate spiderwebs throughout the structure or for attachment to supports or affixing decoration to the outside. Females lay 1 to 6 eggs, most typically 2 or 3. Both males



Kirk's White-eye, *Zosterops kirki*.
Grande Comore, Comoros. © Dubi Shapiro.





These perky songbirds are familiar members of the forest avifauna of Africa, Asia, and many islands of the Pacific. White-eyes are named for the distinct white eye-ring found in most species, and they all share a brush-tipped tongue and a fondness for nectar as a supplement to fruits and insects. They are most commonly olive above and yellow below, but there is considerable variation in plumage despite the overall body-plan uniformity in this group. Yuhinas are generally crested birds in plumages of grays or brown with a bit of contrasting pattern often around the face. They are highly social and active members of mixed-species flocks, and many breed cooperatively.



Rufous-vented Yuhina, *Yuhina occipitalis*. Phrumsengla NP, Bumthang District, Bhutan. © Jon Irvine.

and females help with nest construction, incubation, and feeding chicks. Incubation takes 10 to 16 days, and the chicks are in the nest for 10 to 17 days. Fledglings are fed by parents for up to three weeks after they leave the nest.

**Conservation** Many zosteropid species (33%) are threatened by habitat loss and the introduction of invasive predators (20 NT, 8 VU, 7 EN, 5 CR). The relatively high proportion of species of conservation concern stems from the fact that this family has diversified into many of the archipelagos of the tropical Pacific and Indian oceans, leaving many isolated taxa with very small island ranges. Populations of the Sangihe White-eye *Zosterops nehrkorni* and the White-chested White-eye *Z. albogularis* each comprise fewer than 50 birds, and sightings of either species on their respective single-island ranges are extremely rare. These and the other critically endangered species, all island endemic white-eyes, are imperiled by the same factors that have affected others in the family: habitat conversion for agriculture; habitat destruction by typhoons; depredation by introduced rats, snakes, and birds; and competition by introduced birds. One species, the Robust White-eye *Z. strenuus*, previously lived on Lord Howe Island, but it declined rapidly to extinction with the introduction of rats to the island in 1918. Even in other zosteropid genera that have not diversified so explosively, there are species in serious trouble in small island ranges. For example, the endangered Flame-templed Babbler *Dasycrotapha speciosa* is known only from a handful of localities on each of two islands in the Philippines where deforestation is isolating the bird in ever smaller and more scattered highland forest patches.

**Relationships** Zosteropidae is part of the sylvioid radiation of the oscine passerines. The members of Zosteropidae have at times been placed among various different families, including Sylviidae *sensu lato*, Timaliidae *sensu lato*, and Promeropidae. Owing to the unusual tongue morphology of members of this family, Zosteropidae has also often been placed close to Meliphagidae and Nectariniidae. However, molecular phylogenetic studies now show, with remarkable consensus, that Zosteropidae is sister to the clade of all the various babbler families, Timaliidae, Leiothrichidae, and Pellorneidae, (Cibois 2003, Alström *et al.* 2006, Gelang *et al.* 2009, Fregin *et al.* 2012, Moyle *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).



Mountain White-eye, *Zosterops montanus*. Mount Kitanglad, Bukidnon, Mindanao, the Philippines. © Nick Athanas.



Whiskered Yuhina, *Yuhina flavicollis*. Pangot, Uttarakhand, India. © Con Foley.



Stripe-throated Yuhina, *Yuhina gularis*. Gaoligong Mountains, Yunnan, China. © Christian Artuso.

*Yuhina*
11 species



*Y. brunneiceps*
Taiwan Yuhina

*Zosterornis*
5 species



*Z. striatus*
Luzon Striped Babbler

*Lophozosterops*
10 species



*L. dohertyi*
Crested White-eye

*Cleptornis*
1 species



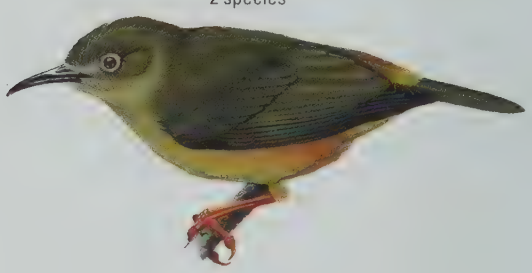
*C. marchei*
Golden White-eye

*Apalopteron*
1 species



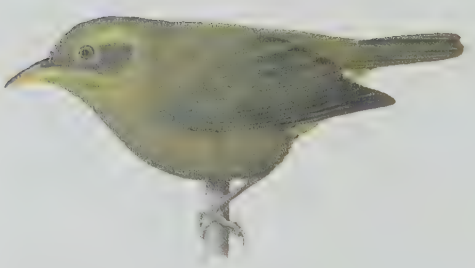
*A. familiare*
Bonin White-eye

*Rukia*
2 species



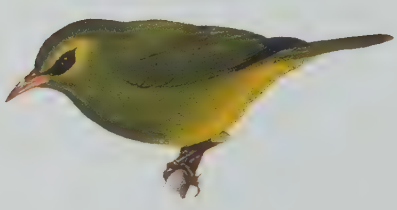
*R. longirostra*
Long-billed White-eye

*Megazosterops*
1 species



*M. palauensis*
Giant White-eye

*Chlorocharis*
1 species



*C. emiliae*
Mountain Black-eye

*Sterrhoptilus*
3 species



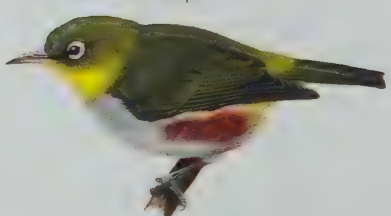
*S. dennistouni*
Golden-crowned Babbler

*Dasycrotapha*
3 species



*D. speciosa*
Flame-templed Babbler

*Zosterops*
81 species



*Z. erythropleurus*
Chestnut-flanked White-eye

*Tephrozosterops*
1 species



*T. stalkeri*
Bicolored White-eye

Passeriformes, Sylvioid Oscines

# TIMALIIDAE
## Tree Babblers

10 genera • 51 species

**Related Families** Pellorneidae (ground babblers and allies), Leiothrichidae (laughing-thrushes and allies)

**Similar Birds** Australasian babblers (Pomatostomidae), babblers (Pellorneidae and Sylviidae), thrushes (Turdidae and Muscicapidae), antbirds (Thamnophilidae), wrens (Troglodytidae)

**Description**
- Plumage usually earth-toned; browns, black, and grays dominant, often with contrasting pattern in the face
- Wings short to medium, rounded; tail very short to long, medium in most
- Body small to medium, cylindrical ovoid, with hunched posture
- Bill short and straight to medium-long and decurved
- Head and neck medium-sized
- Legs and feet medium, generally stout
- Sexes generally similar

**Habitat** The tree babblers are forest dwellers whose habitats range from dry forest to humid rainforest, and several species are bamboo specialists.

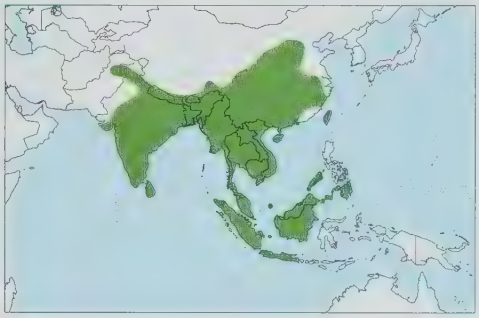
**Food** Timaliids feed primarily on insects and other invertebrates, mostly by gleaning them from leaves and, more commonly, branches. Some species also feed on berries, seeds, and even nectar, especially when insects are scarce.

**Breeding** The tree babblers are monogamous with biparental care, and there are apparently no colonial or aggregated breeders in this family. The nests of timaliids are typically either globular or domed, and are usually built on or near the ground. Nests are generally constructed of leaves, twigs, bamboo, rootlets, and moss.



Black-throated Babbler, *Stachyris nigricollis*. Krung Ching, Thailand. © Francesco Veronesi.

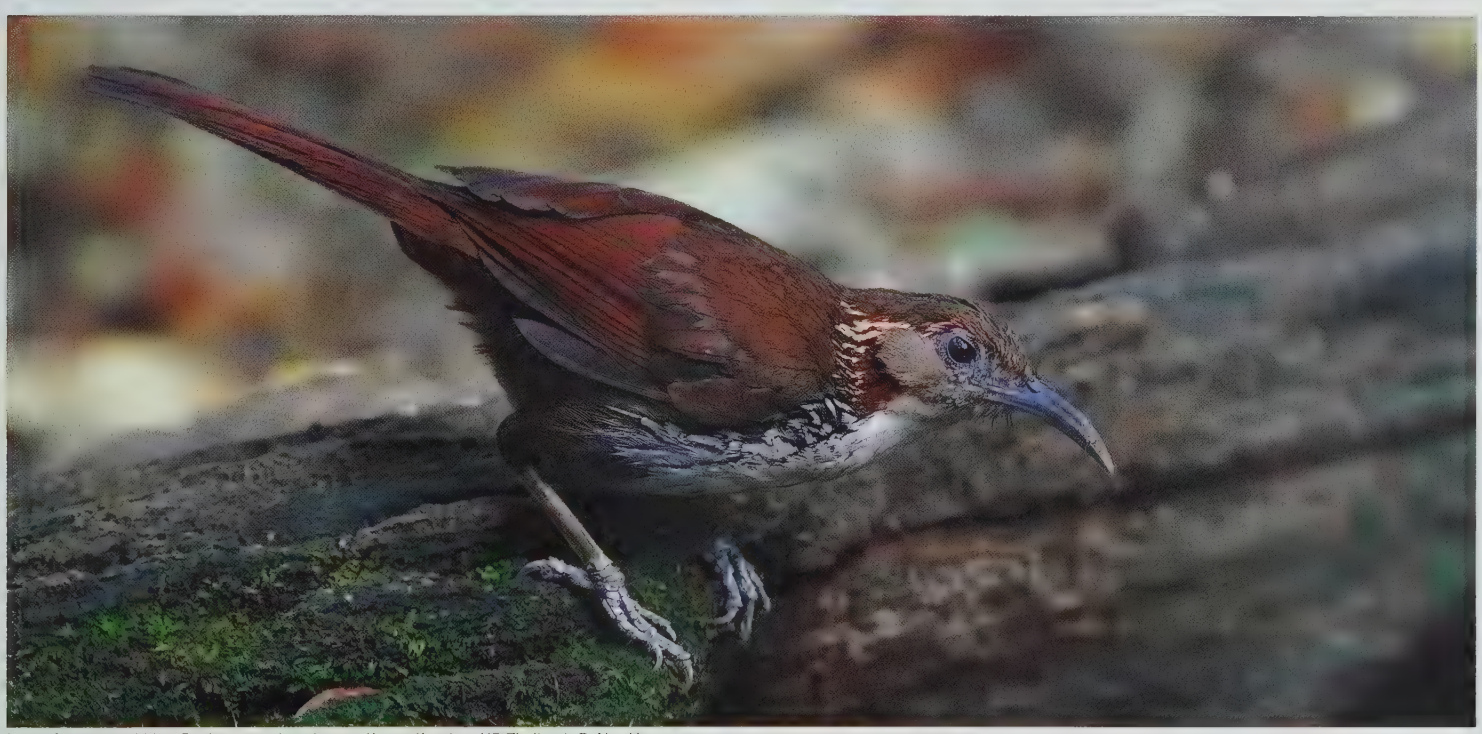




Some species build more-open cup nests placed behind bark or in the hollow of a tree or log. Females lay 2 to 5 eggs, with larger clutches to the north. Although other babbler families are better studied, it appears that both males and females help with nest construction, incubation, and feeding of the chicks. With information on only a few species, incubation apparently takes about 12 days and nestlings are in the nest for at least 10 to 11 days. Much more information is clearly needed.

**Conservation** Habitat loss and fragmentation are the main threats to timaliids, 12 species of which (24%) are of conservation concern (8 NT, 4 VU). The two vulnerable wren-bab-

This newly restricted Timaliidae includes only a subset of what was once a much more inclusive babbler family. These "tree babblers" occupy all strata of Asian forests, but only a few spend much time on the ground. Plumages are dominated by black and gray or rich brown, most species with liberal patterning in spots and streaks. Most have generic passerine proportions, although a few are less mundane: the scimitar babblers with their long, decurved, yellow bills, and the wren-babblers with their perky tail-up posture. Timaliid vocalizations are diverse and frequently heard, and some species inflate blue-pigmented throat sacs when they sing. Many species are quite social, but quite a few of the others appear to be monogamous, defending simple all-purpose territories.



Large Scimitar Babbler, *Erythrogenys hypoleucos*. Kaeng Krachan NP, Thailand. © Alex Vargas.

blers, Rusty-throated *Spelaeornis badeigularis* and Tawny-breasted *S. longicaudatus*, are restricted to tiny ranges in the eastern Himalayas. Both are extremely secretive and difficult to observe, and both live in areas in which their forest habitat is being harvested and converted to agriculture. In the same region, the vulnerable Snowy-throated Babbler *Stachyris oglei* is known from only four localities in India and one in Myanmar, and deforestation is ongoing throughout this region. Similarly, the vulnerable Nonggang Babbler *Stachyris nonggangensis* has a very restricted distribution along the China-Vietnam border, recent surveys finding it only in three reserves in the region.

Relationships Timaliidae is part of the sylvioid radiation. Recent molecular phylogenetic studies have resulted in the division of the formerly large babbler family (Timaliidae *sensu lato*) into five related but distinct families, one of which (the much smaller revised Timaliidae) now consists of the tree and scimitar babblers (Cibois 2003, Gelang *et al.* 2009, Moyle *et al.* 2012). Its exact position within this clade is not entirely resolved, but Timaliidae appears to be sister either to Pellorneidae (Cibois 2003) or to a clade composed of Pellorneidae and Leiothrichidae (Gelang *et al.* 2009, Fregin *et al.* 2012, Moyle *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).



Fluffy-backed Tit-Babbler, *Macronus ptilosus*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.

*Spelaeornis*
8 species

*S. troglodytoides*
Bar-winged Wren-Babbler

*Pomatorhinus*
9 species

*P. schisticeps*
White-browed Scimitar Babbler

*Erythrogenys*
6 species

*E. hypoleucos*
Large Scimitar Babbler

*Stachyris*
13 species

*S. strialata*
Spot-necked Babbler

*Dumetia*
1 species

*D. hyperythra*
Tawny-bellied Babbler

*Rhopocichla*
1 species

*R. atriceps*
Dark-fronted Babbler

*Timalia*
1 species

*T. pileata*
Chestnut-capped Babbler

*Mixornis*
4 species

*M. gularis*
Pin-striped Tit-Babbler

*Macronus*
2 species

*M. ptilosus*
Fluffy-backed Tit-Babbler

*Cyanoderma*
6 species

*C. chrysaeum*
Golden Babbler

Passeriformes, Sylvioid Oscines

# PELLORNEIDAE
## Ground Babblers and Allies

16 genera • 59 species

**Related Families** Leiothrichidae (laughing-thrushes and allies), Timaliidae (tree babblers)

**Similar Birds** Babblers (Timaliidae and Sylviidae), ant-thrushes (Formicariidae), thrushes (Turdidae and Muscicapidae), antbirds (Thamnophilidae), wrens (Troglodytidae)

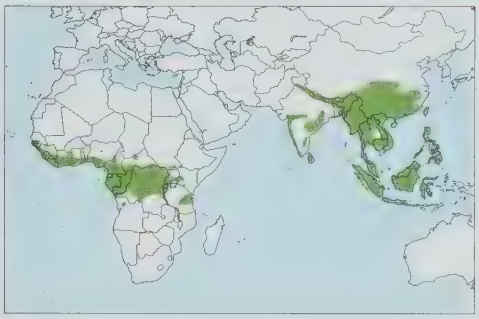
**Description**
- Plumage earth-toned, with browns, blacks, grays, and whites dominant
- Wings medium-short; tail short in most
- Body small to medium, cylindrical ovoid, with hunched or horizontal posture
- Bill short to medium, straight
- Head large; neck short, thick
- Legs long; feet large
- Sexes generally similar

**Habitat** The ground babblers live in a variety of forest types, usually with dense undergrowth, ranging from cooler, high-elevation forests to low-elevation tropical rainforest.



Black-capped Babbler, *Pellorneum capistratum*. Panti Bird Sanctuary, Johor, Malaysia. © Con Foley.





**Food** Most of the pellorneids feed almost entirely on insects and spiders, worms, and snails, mostly by foraging on the ground, probing the soil, and picking through leaf litter. Others glean insects from leaves and branches, most often in lower strata. Some do eat berries and seeds, though these are not a major part of the diet of any species.

**Breeding** Pellorneids are monogamous with biparental care, though it appears that at least *Illadopsis* species may be simple cooperative breeders. The nest structure of this family is diverse, ranging from small, tidy, open cups (some of which are suspended from branches) to domed and semi-domed nests. Nests are typically constructed of leaves, twigs, rootlets, and moss, and are often lined with finer materials. Nest placement varies, but is either well concealed on the ground or in a low, dense bush or tree. Females lay 2 to 5 eggs. Both male and female help with nest construction and incubation, or, in *Illadopsis*, the female alone incubates. Incubation takes about 10 to15 days. Both parents, and any helpers, provision the chicks, which remain in the nest for 10 to 14 days before fledging. They are attended and fed after fledging, for up to nine weeks in some species.

**Conservation** Habitat loss is the major threat to pellorneids, 17 species of which (29%) are

This family of Asian forest birds is another subset of the once enormous timaliid babbler family. The ground babblers are long-legged, short-tailed birds with a simple repertoire of high whistled songs. Spending most of their time on the ground or in lower vegetation, they are very often heard long before they are seen, in part due to their earth-toned plumage, generally light beneath and with a crown or mask to break up their outlines. The fulvettas in this family are generic passerine birds mostly clad in plain browns, the Golden-fronted Fulvetta being the exception to this rule. Generally common in forest and woodland mid-story, pellorneids repeat their simple songs most of the day, often still singing when most other forest inhabitants have gone silent.



Horsfield's Babbler, *Malacocincla sepiaria*. Tawau Hills Park, Sabah, Borneo. © Drew Fulton.

of conservation concern (12 NT, 4 VU, 1 EN). The endangered White-throated Wren-babbler *Rimator pasquieri* is known from only a tiny range in three reserves in Vietnam where forest clearance and cultivation of cardamom in the understory pose immediate threats. The four vulnerable pellorneid species include two *Ptilocichla* species, the Palawan and Bornean Ground Babblers (*P. falcata* and *P. leucogrammica*, respectively), which appear to be reliant on undisturbed primary lowland forest, a habitat that is extremely scarce and scattered in both Palawan and Borneo. The vulnerable Marsh Babbler *Pellorneum palustre* has a tiny and restricted range in the Assam Plain of India, where marshes and seasonally flooded grasslands have been all but eliminated by drainage for grazing. And finally, the Golden-fronted Fulvetta *Schoeniparus variegaticeps* is limited to patches of subtropical forest in a handful of nature reserves in Sichuan, China.

Relationships Pellorneidae is part of the large superfamily Sylvioidea of the oscine passerines. Until recently, the members of Pellorneidae were placed within the large and diverse babbler family (Timaliidae *sensu lato*). Recent molecular phylogenetic studies have broken up the former babblers into five separate families, one of which comprises the *Schoeniparus* fulvettas and ground babblers. The first molecular study identifying this new Pellorneidae indicated that it is sister to Timaliidae, with those two taken together sister to Leiothrichidae (Cibois 2003). All subsequent studies confirm the distinctness of Pellorneidae, but indicate instead that it is sister to Leiothrichidae, and the two of them together are sister to Timaliidae (Gelang *et al.* 2009, Moyle *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).



Short-tailed Babbler, *Trichostoma malaccense*. Central Catchment, Singapore. © Con Foley.

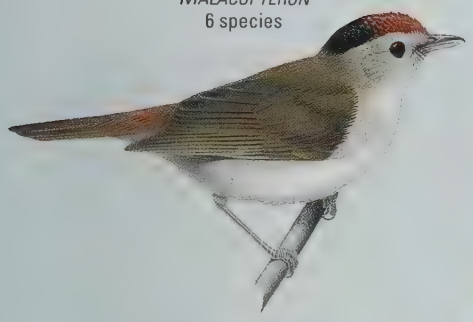


Puff-throated Babbler, *Pellorneum ruficeps*. Phu Khiao, Thailand. © Con Foley.



Scaly-crowned Babbler, *Malacopteron cinereum*. Krung Ching, Thailand. © Francesco Veronesi.

*Malacopteron*
6 species



*M. cinereum*
Scaly-crowned Babbler

*Gampsorhynchus*
2 species



*G. rufulus*
White-hooded Babbler

*Schoeniparus*
7 species



*S. variegaticeps*
Golden-fronted Fulvetta

*Laticilla*
2 species



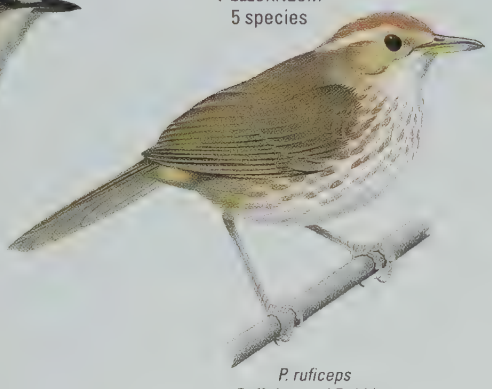
*L. cinerascens*
Swamp Prinia

*Illadopsis*
8 species



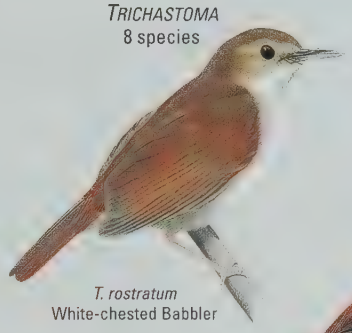
*I. cleaveri*
Black-capped Illadopsis

*Pellorneum*
5 species



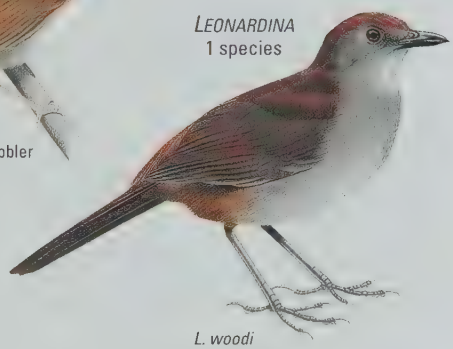
*P. ruficeps*
Puff-throated Babbler

*Trichastoma*
8 species



*T. rostratum*
White-chested Babbler

*Leonardina*
1 species



*L. woodi*
Bagobo Babbler

*Kenopia*
1 species



*K. striata*
Striped Wren-Babbler

*Malacocincla*
3 species



*M. perspicillata*
Black-browed Babbler

*Turdinus*
7 species



*T. marmoratus*
Marbled Wren-Babbler

*Ptilocichla*
3 species



*P. leucogrammica*
Bornean Ground Babbler

*Napothera*
1 species



*N. epilepidota*
Eyebrowed Wren-Babbler

*Jabouilleia*
1 species



*J. danjoui*
Indochinese Wren-Babbler

*Rimator*
3 species



*R. pasquieri*
White-throated Wren-Babbler

*Graminicola*
1 species



*G. bengalensis*
Rufous-rumped Grassbird

# LEIOTHRICHIDAE

## Laughing-thrushes and Allies

21 genera • 138 species

**Related Families** Pellorneidae (ground babblers and allies), Timaliidae (tree babblers)

**Similar Birds** Babblers (Zosteropidae and Sylviidae), thrushes and solitaires (Turdidae and Muscicapidae), antbirds (Thamnophilidae), shrike-babblers (Vireonidae)

**Description**

- Plumage boldly patterned in black, gray, and/or white or with a background of earth tones, with additional yellows, reds, greens, or pink somewhere on the body
- Wings rounded; tail long
- Body small to medium, cylindrical ovoid, robust
- Bill short to medium, straight
- Head medium to large; neck short, thick
- Legs medium to long, often stout; feet medium
- Sexes similar

**Habitat** The laughing-thrushes and their allies display diverse habitat preferences, from *Acacia* savanna and open woodlands (primarily *Turdoides* babblers) to dense rainforest. Most species occupy more-forested habitats.

**Food** Leiothrichids are primarily insectivorous, feeding on a broad array of insects and other arthropods; the larger species also take small vertebrates. In addition to insects, many *Leiothrix* and *Turdoides* species also consume fruit, seeds, and nectar. Many species glean insects from leaves and branches, or pick invertebrates from the ground.

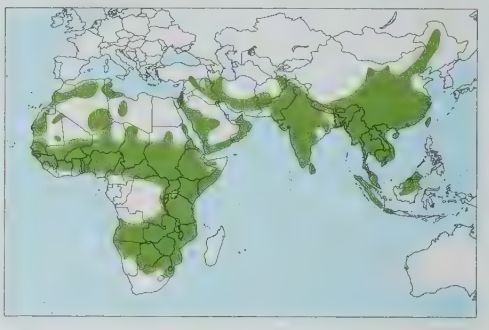
**Breeding** Although most leiothrichids are monogamous with biparental care, many babblers in the genus *Turdoides* are cooperative breeders, with males sometimes serially polygynous and two pairs sometimes breeding in the same nest. Nests of the leiothrichids are generally open cups, which can be lined with roots and other vegetation, or covered with moss and lichen as camouflage. Nests are typically placed in a bush, shrub, or tree. Females lay 2 to 6 eggs, with clutch sizes generally larger farther north. Both males and females participate in nest construction, incubation of eggs, and raising the chicks, and helpers in cooperative-breeding species sometimes help with all parental duties, including incubation. Incubation takes 13 to 17 days, and the nestlings leave the nest after 9 to 16 days, occasionally as long as 21 days. Post-fledging care lasts up to six months in cooperatively breeding species, and probably less than a month in most other species.

**Conservation** The primary threats to the 28 leiothrichid species of conservation concern (28%) come from habitat loss and collection for the songbird trade (12 NT, 10 VU, 4 EN, 2 CR). The critically endangered Bugun Liocichla *Liocichla bugunorum* was first described by



Lesser Necklaced Laughing-thrush, *Garrulax monileger*. Kaeng Krachan NP, Thailand. © Alex Vargas.





The members of this family are longer tailed and bigger bodied than most of the other groups known informally as "babblers." Their plumages range from dramatically contrasting black-and-white to some of the most beguiling combinations of browns, pinks, and greens in the bird world. Most spend their lives in mid to upper levels of moist forest vegetation, but the *Turdoides* babblers branch out into scrub and savanna habitats throughout Africa and the Middle East. What these latter, husky birds lack in bright plumage colors they make up for in the rich social complexity of their cooperative breeding groups. Prized as cage-bird songsters, many laughing-thrushes are at risk from an often-illegal pet trade.



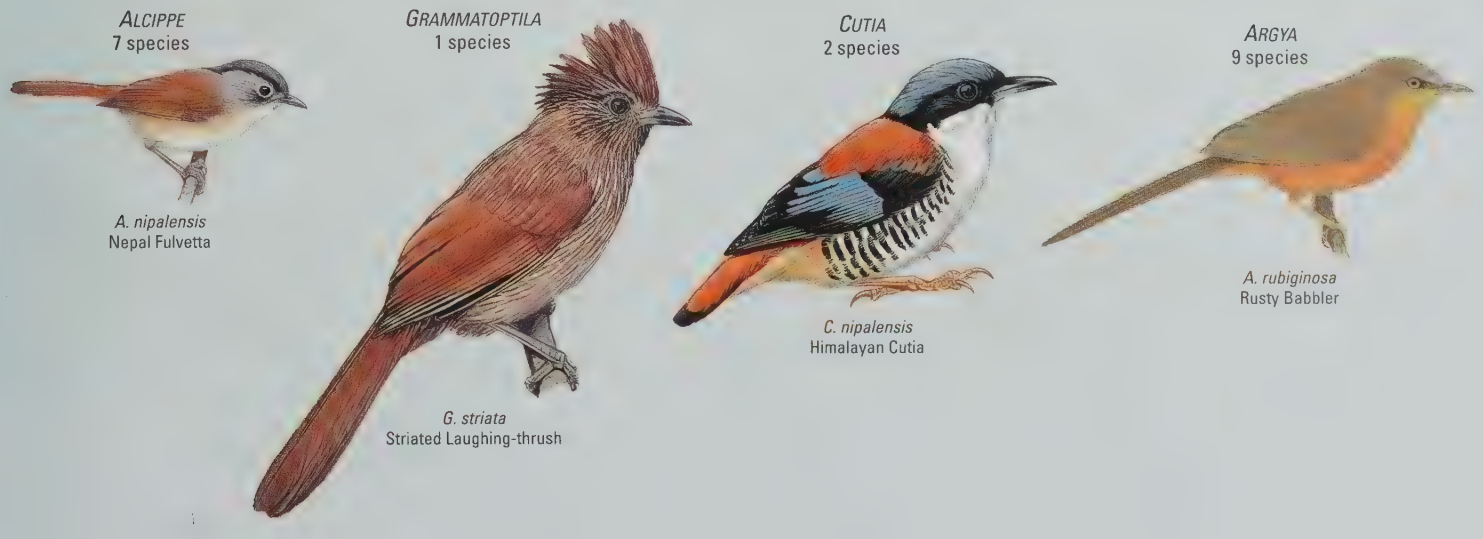
Scarlet-faced Liocichla, *Liocichla ripponi*. Doi Lang, Thailand. © Con Foley.



White-throated Laughing-thrush, *Garrulax albogularis*. Pangot, Uttarakhand, India. © Varun HB.

science in 2006, when fears about its tiny known population led to a decision to release alive the bird designated as the type specimen. Currently known from only three sites in far eastern India, all within 20 km of each other, the current population is feared to be fewer than 250 individuals. The other critically endangered leiothrichid is the Blue-crowned Laughing-thrush *Garrulax courtoisi*, known from two very widely separated localities in China, where fewer than 300 or so individuals in the wild have been supplemented by about 200 individuals from captive breeding programs in the United States, Europe, and Hong Kong. Of the four endangered leiothrichids, all are restricted-range species: The White-throated Mountain Babbler *Kupeornis gilberti* is restricted to forest fragments in the mountains of Cameroon, West Africa. The Collared Laughing-thrush *Trochalopteron yersini* and Gray-crowned Crocias *Laniellus langbianis* inhabit scattered forest fragments in the Lang Bian mountains of south-central Vietnam. All of these hill-forest leiothrichids are under siege from exploitation of forest fragments for timber and firewood, intensive grazing, fire, and clearing for agriculture. The Rufous-fronted Laughing-thrush *Garrulax rufifrons* is limited to forest fragments in the hills of western Java, where the cage-bird trade is its greatest threat.

Relationships Leiothrichidae is part of the superfamily Sylvioidea of oscine passerines. It was once part of the large Timaliidae *sensu lato*, but recent molecular phylogenetic studies have resulted in the division of the former babblers into five related but distinct families: Sylviidae, Zosteropidae, Timaliidae, Pellorneidae, and Leiothrichidae (Cibois 2003, Gelang *et al.* 2009, Moyle *et al.* 2012, Fregin *et al.* 2012, Alström *et al.* 2013a). The first molecular study of the group (Cibois 2003) indicated that Leiothrichidae is sister to the clade made up of Timaliidae and Pellorneidae. All of the more recent studies indicate that Leiothrichidae is sister to Pellorneidae, with these two families together in turn sister to Timaliidae (Gelang *et al.* 2009, Moyle *et al.* 2012, Alström *et al.* 2013a, Olsson *et al.* 2013).

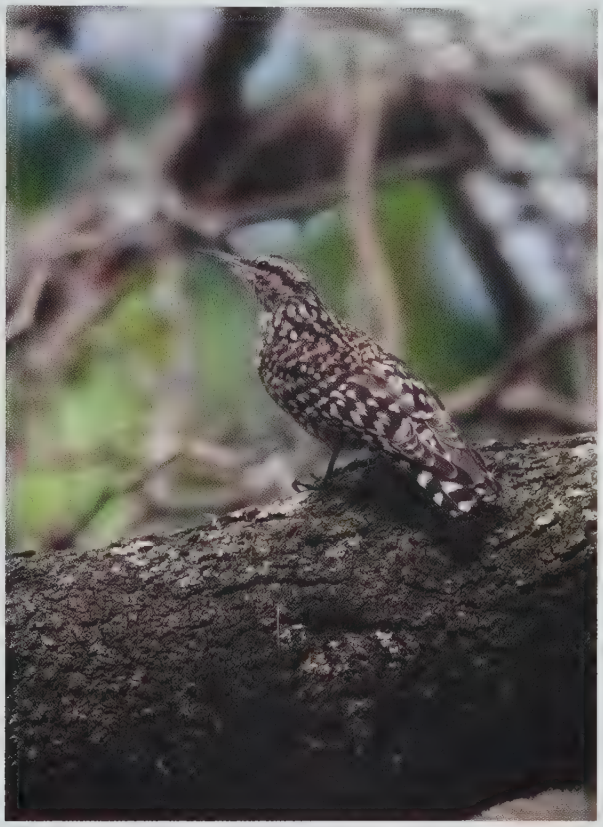



ACANTHOPTILA
1 species
A. nipalensis
Spiny Babbler
CHATARRHAEA
2 species
C. gularis
White-throated Babbler
KUPEORNIS
3 species
K. rufocinctus
Red-collared Mountain Babbler
PHYLLANTHUS
1 species
P. atripennis
Capuchin Babbler
TURDOIDES
17 species
T. leucopygia
Northern White-rumped Babbler
GARRULAX
47 species
G. courtoisi
Blue-crowned Laughing-thrush
TROCHALOPTERON
21 species
T. affine
Black-faced
Laughing-thrush
HETEROPHASIA
7 species
H. picaoides
Long-tailed Sibia
LEIOTHRIX
2 species
L. lutea
Red-billed Leiothrix
LEIOPTILA
1 species
L. annectens
Rufous-backed Sibia
MINLA
1 species
M. ignotincta
Red-tailed Minla
LIOCICHLA
5 species
L. bugunorum
Bugun Liocichla
SIBIA
4 species
S. souliei
Streaked Barwing
SIVA
1 species
S. cyanouroptera
Blue-winged Siva
CHRYSOMINLA
1 species
C. strigula
Bar-throated Minla
ACTINODURA
3 species
A. ramsayi
Spectacled Barwing
LANIELLUS
2 species
L. langbianis
Gray-crowned Crocias

# Order: Passeriformes, Certhioid Oscines

## Families: Certhiidae, Sittidae, Polioptilidae, Troglodytidae

Certhioidea includes treecreepers, nuthatches, gnatcatchers, and wrens, all groups that variously have been placed in Sylvioidea or Muscicapoidea in the past. Within this group, the wrens are sister to the gnatcatchers and gnatwrens, and these are in turn sister to the nuthatches. The treecreepers are sister to the remaining families in the group (Barker *et al.* 2004, Johansson *et al.* 2008b, Alström *et al.* 2013a).



African Salpornis, *Salpornis salvadori*. Awassa, Ethiopia. © Ken Behrens.



Wallcreeper, *Tichodroma muraria*. Rilong, Sichuan, China. © Tang Jun.

# CERTHIIDAE

## Treecreepers

1 genus • 9 species

**Related Families** Sittidae (nuthatches), Polioptilidae (gnatcatchers and gnatwrens), Troglodytidae (wrens)

**Similar Birds** Woodcreepers (Furnariidae), Australasian treecreepers (Climacteridae)

**Description**

- Plumage cryptic, brown on back, streaked with black and cream, and white underneath
- Wings medium long; tail medium-long, graduated, with stiff, pointed tips on rectrices
- Body small, elongate ovoid
- Bill long and slender, laterally compressed, slightly decurved
- Head medium-large; neck short, thick
- Legs short; toes long, with long, sharp, curved claws
- Sexes similar

**Habitat** The treecreepers live in forests and woodland, where they forage almost exclusively on the trunks and larger branches of trees.

**Food** Certhiids are primarily insectivorous, taking a wide assortment of small insects and spiders. Most food is obtained by gleaning and probing bark crevices on trees, very occasionally by sallying or hover-gleaning. When insects are scarce, treecreepers will eat seeds.

**Breeding** Treecreepers are monogamous with biparental care. The typical nest site for treecreepers is the gap between a large, loosely hanging chunk of bark and the trunk of a tree. If such sites are not available, they will use a knothole or abandoned woodpecker nest-hole. In this shelter, they build a base of bark and twigs, with an inner cup of finer material such as grass, moss, spiderwebs, lichens, feathers, and wood fibers. Female treecreepers generally lay 3 to 6 eggs. Both sexes are active in nest construction, though only the female incubates. The male feeds the female while she incubates, and both male and female feed the chicks. Incubation takes about 15 days, and the young fledge after two to three weeks in the nest. The fledglings are fed by the parents for up to 17 days or so after they leave the nest.

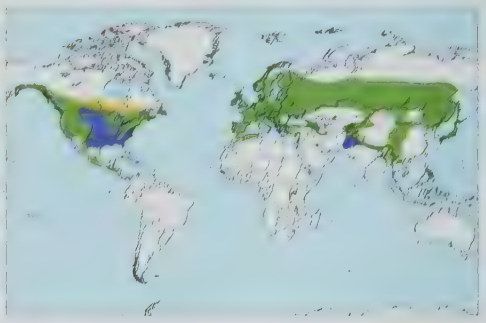


Short-toed Treecreeper, *Certhia brachydactyla*. Krasinski Park, Warsaw, Poland. © Michal Jonczyk.

**Conservation** Forest birds everywhere are facing pressure from the conversion of forest habitats, but only one treecreeper species (11%) has a small enough range that the conversion of its temperate forest habitat has caused conservation concerns (LNT). The Sichuan Treecreeper *Certhia tianquanensis* is limited to very few forest patches in the mountains of Sichuan, China, where development and disturbance are pressing concerns.

**Relationships** The treecreepers are part of the superfamily Certhioidea of oscine passerines (Alström *et al.* 2013a, Alström *et al.* 2014, Cracraft 2014). Certhiidae has long been thought to be sister to Sittidae, a sister relationship that is supported by some recent molecular phylogenetic evidence (Barker *et al.* 2004, Reddy & Cracraft 2007). Alternatively, Certhiidae may be sister to the clade made up of Polioptilidae plus Troglodytidae (Barker 2004, Zuccon *et al.* 2006), or, perhaps most likely of all, sister to the rest of Certhioidea (Johansson *et al.* 2008b, Alström *et al.* 2013a).





Treecreepers "creep" up forest tree trunks with a series of mouse-like small hops, spiraling up around the trunk in search of small arthropods, which they glean from crevices in bark and branches with their fine, slightly decurved bills. Like other tree-climbing birds, treecreepers possess stiffened tail feathers for support on tree trunks. Their brown-toned plumages with contrasting streaks and spots make these diminutive birds hard to see from afar, and their high sibilant calls are difficult to localize. Spending all their lives on tree trunks and large branches, certhiids even place their nests beneath a flap of loose bark. Most diverse in the mountains of Asia, these forest birds are widespread throughout the forests of the north temperate zone.



Eurasian Treecreeper, *Certhia familiaris*. Igneada, Kirklareli, Turkey. © Murat Cubadaroglu

*CERTHIA*
9 species



*C. americana*
American Treecreeper

Passeriformes, Certhioid Oscines

# SITTIDAE
## Nuthatches

3 genera • 30 species

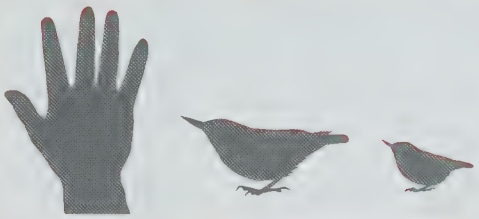
**Related Families** Certhiidae (treecreepers), Troglodytidae (wrens), Polioptilidae (gnatcatchers and gnatwrens)

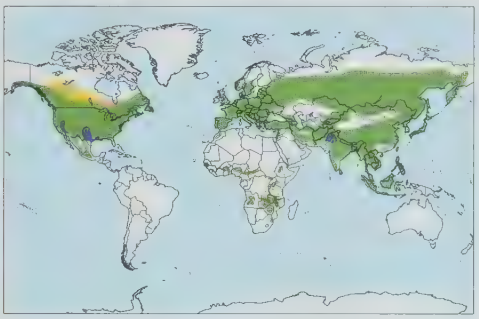
**Similar Birds** Sittellas (Neosittidae), treerunners (Furnariidae), Nuthatch Vanga (Vangidae)

**Description**
- Plumage most often gray or blue above, light below, many with dark eye-line or mask
- Wings medium-long, pointed in most; tail short, truncate
- Body small to medium, compact, cylindrical ovoid
- Bill medium length, stout, straight with very slight recurvature in many; in *Tichodroma* and *Salpornis* bill long to very long, slender, slightly decurved
- Head medium; neck short, thick
- Legs short; toes long, stout, with long, laterally compressed claws
- Males in some species more brightly colored than females



White-breasted Nuthatch, *Sitta carolinensis*. Pike Lake Provincial Park, Saskatchewan, Canada. © Nick Saunders.





**Habitat** Nuthatches occupy a wide variety of forested and rocky habitats, from tropical rainforest to savanna woods, boreal taiga, and mountain cliffs and scree.

**Food** Most nuthatches, especially in the northern parts of their range, feed primarily on insects and other arthropods during the warmer months and switch to seeds during the colder months. Wallcreepers *Tichodroma muraria* and *Salpornis* are thought to eat only invertebrates. Distinctively, nuthatches typically forage by climbing up and down tree trunks (or rock faces), often descending headfirst as they probe crevices for hidden arthropods. Some of the larger species will hammer and chip away at bark in search of insects, and at least the Brown-headed Nuthatch *Sitta pusilla* has been observed using pieces of bark to help pry off larger pieces of bark from tree trunks in search of insects.

**Breeding** Sittids are monogamous with biparental care, and Pygmy Nuthatch *S. pygmaea* and Brown-headed Nuthatch appear to be the only species that are cooperative breeders. All sittids nest in cavities, which they either excavate themselves in rotting wood or find already made in a tree-hole or rock crevice. The non-excavators very often restrict or reinforce the hole to their nesting cavity with a plaster made of mud, dung, and plant resins, and this plaster sometimes extends into a short tunnel and mound surrounding the entrance. Spotted Creepers build a deep cup nest of plant stems, rootlets, and bark chips cemented together;

With short tails and very large, strong feet, nuthatches are ideally suited to life on vertical tree surfaces. These birds are masters of bark, moving both up and down tree limbs and trunks with alacrity. Adept at finding small invertebrates hiding in tiny cracks in bark, they will enlarge a hole to get at prey, most often with their bills, but even at times by using another piece of bark as a lever. During the temperate winter, these birds earn their English name by cracking open seeds and nuts with their large, sturdy bills. A few nuthatches have adapted to living on rock walls, and the distantly related Wallcreeper has taken that lifestyle to the extreme. Both the Wallcreeper and *Salpornis* species have longer and finer bills and tails than their nuthatch cousins.



Blue Nuthatch, *Sitta azurea*. Fraser's Hill, Pahang, Malaysia. © Con Foley.

they line it with spiderwebs and affix bark chips and lichens to make a very cryptic nest in the fork of a branch. Wallcreepers typically nest in rock crevices, building a dense nest of moss, plant fibers, and feathers. Some nuthatch species spread tree resin or the scents from insects around the tree trunk surrounding their nest entrance. Nest cavities are lined with grasses, rootlets, hair, fur, and other soft materials. Females lay 1 to 8 eggs. Both parents help with nest construction. Only the female incubates, but both male and female feed the young. Incubation takes 12 to 19 days, and the chicks leave the nest after 18 to 29 days. They are fed for up to 11 days or so post-fledging.

Conservation Human population pressure on already restricted and fragmented ranges is the major concern for the eight species of nuthatches (28%) facing immediate threats (3 NT, 2 VU, 3 EN). The three endangered nuthatch species all have small populations: the Algerian Nuthatch *Sitta ledanti* in remnant forest in northern Algeria, the White-browed Nuthatch *S. victoriae* in southern Myanmar, and the Giant Nuthatch *S. magna* in remnant pine mountain forests in Thailand, Myanmar, and China. All of these habitats are being exploited for timber harvesting and agriculture.

Relationships Sittidae is part of the certhioid radiation of oscine passerines (Barker *et al.* 2004, Johansson *et al.* 2008b, Alström *et al.* 2013a, Alström *et al.* 2014, Barker 2014, Cracraft 2014). The exact position of Sittidae within this superfamily is not well resolved, although some studies support a sister relationship with Certhiidae (Barker *et al.* 2004, Reddy & Cracraft 2007). Alternatively, the nuthatches may be sister to the clade made up of Polioptilidae plus Troglodytidae (Johansson *et al.* 2008b) or to Troglodytidae by itself (Alström *et al.* 2013a) or to the rest of Certhioidea (Barker 2004). Two genera are sufficiently distinct to deserve their own subfamilies: *Tichodroma* has long been difficult to place and is sometimes treated as a distinct family. We here follow tradition and place it with Sittidae, though there is very little evidence one way or the other (Cracraft 2014). *Salpornis*, the other odd genus in the family, may look more like a certhiid than a sittid, but molecular evidence shows it to be the latter (Johansson *et al.* 2008b).



Wallcreeper, *Tichodroma muraria*. Gran Paradiso NP, Aosta Valley, Italy. © Francesco Veronesi.



Velvet-fronted Nuthatch, *Sitta frontalis*. Ooty, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.

Subfamily **SITTINAE**

*SITTA*
27 species



*S. castanea*
Indian Nuthatch

Subfamily **TICHODROMINAE**

*TICHODROMA*
1 species



*T. muraria*
Wallcreeper

Subfamily **SALPORNITHINAE**

*SALPORNIS*
2 species



*S. spilonota*
Indian Salpornis

Passeriformes, Certhioid Oscines

# POLIOPTILIDAE

## Gnatcatchers and Gnatwrens

3 genera · 18 species

**Related Family** Troglodytidae (wrens)

**Similar Birds** Sylviid warblers (Sylviidae), apalises and prinias (Cisticolidae), kinglets (Regulidae), wrens (Troglodytidae), fairywrens (Maluridae)

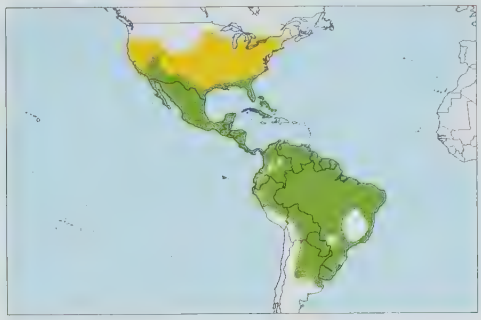
**Description**

- Plumage primarily blue-gray or brown, often with white and black in cap or tail
- Wings medium-long, pointed; tail short to (in most species) long, often held cocked over the back
- Body very small, ovoid
- Bill thin; short to medium in gnatcatchers, long to very long in gnatwrens
- Head small to medium; neck short
- Legs medium-long, delicate; toes short and thin
- Male gnatcatchers with a little more black in plumage



Masked Gnatcatcher, *Polioptila dumicola*.
Red-fronted Macaw Lodge, Bolivia. © Dubi Shapiro.





These tiny insectivores often forage in groups, and usually with the tail cocked or flicking animatedly. Bundles of energy constantly on the move, they use their tails to balance as they do perky pirouettes on one perch, then jump or flutter off to another in search of prey. With delicate legs and bills, and generally light proportions, they are adorned in simple plumages of blue-gray or brown, often with a little black cap or pattern around the face. The song of *Ramphocaenus* is a slow, whistled trill. In *Microbates* it is a series of whistled notes, though their harsh scolding is more often heard. Singing *Polioptila* species intersperse whistles with their normal high wheezy or whiny twitters.

**Habitat** Polioptilids live in a wide variety of habitats. Gnatwrens dwell in the dense understory of Neotropical forests, and gnatcatchers live in more-open wooded habitats, from desert scrub through thorn forest to tropical rainforest.

**Food** Polioptilids glean small insects and other arthropods from leaves and branches, often flicking their tails actively as they forage. Despite their name, they very rarely take flying gnats on the wing.

**Breeding** Gnatcatchers and gnatwrens are thought to be monogamous, and the male will chase intruders of both sexes out of his territory. Nests of the gnatcatchers (*Polioptila*) are all similar, being neat cups constructed of soft plant fibers fastened together with spiderwebs and covered with lichens on the outside. By contrast, gnatwrens rarely use webs in nest construction, building their nests of moss, plant fibers, and dead leaves. Gnatwren nests are usually placed in the understory, not in the canopy as gnatcatcher nests are. Clutch size for gnatcatchers is 2 to 5 eggs, and 2 is a typical clutch for the gnatwrens. Both parents participate in all aspects of parental care, with male gnatcatchers typically taking the lead role in nest construction. Both adults incubate the eggs and feed the chicks. Incubation takes 14 to 17 days, and young leave the nest after 12 to 14 days there. Post-fledging parental care appears to last about a month or so.

**Conservation** Despite the general stability of



Masked Gnatcatcher, *Polioptila dumicola*. Taco Pozo, Chaco, Argentina. © Ian Davies.

polioptilid populations, there are two species (11%) of conservation concern (1 NT, 1 CR). The critically endangered Iquitos Gnatcatcher *Polioptila clementsi*, a bird only described to science in 2005, occupies an extremely tiny fragment of white-sand forest in Amazonian Peru and appears to be declining due to habitat degradation. The near-threatened Creamy-bellied Gnatcatcher *P. lactea* has been suffering rapid population declines over most of its small range in southeastern Brazil, a result apparently of timber harvest and conversion of woodland and forest to agriculture.

**Relationships:** Historically, the polioptilids were first placed with the antbirds, then with muscicapids, mimids, paridids, and sylviids. Recent molecular work all indicates, however, that Polioptilidae belongs within the certhioid radiation and that it is sister to Troglodytidae, another New World group (Barker 2004, Barker *et al.* 2004, Alström *et al.* 2006, Zuccon *et al.* 2006, Reddy & Cracraft 2007, Johansson *et al.* 2008b).



Blue-gray Gnatcatcher, *Polioptila caerulea*. Fannie Stebbins Wildlife Refuge, Longmeadow, Massachusetts, USA. © Ian Davies.



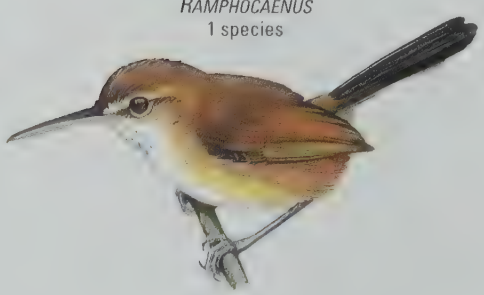
Long-billed Gnatwren, *Ramphocaenus melanurus*. Arenal Oasis, Alajuela, Costa Rica. © Alex Vargas.

*MICROBATES*
2 species



*M. collaris*
Collared Gnatwren

*RAMPHOCAENUS*
1 species



*R. melanurus*
Long-billed Gnatwren

*POLIOPTILA*
15 species



*P. plumbea*
Tropical Gnatcatcher

Passeriformes, Certhioid Oscines

# TROGLODYTIDAE

Wrens

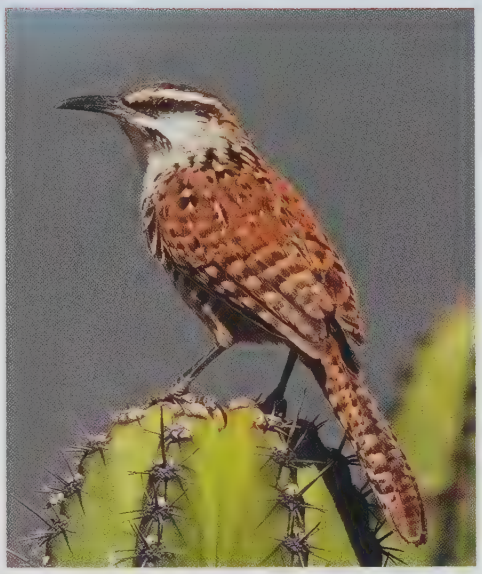
19 genera • 85 species

**Related Families** Polioptilidae (gnatcatchers and gnatwrens), Certhiidae (treecreepers), Sittidae (nuthatches)

**Similar Birds** Cupwings (Pnoepygidae), canasteros (Furnariidae), bush warblers (Scotocercidae), tapaculos (Rhinocryptidae)

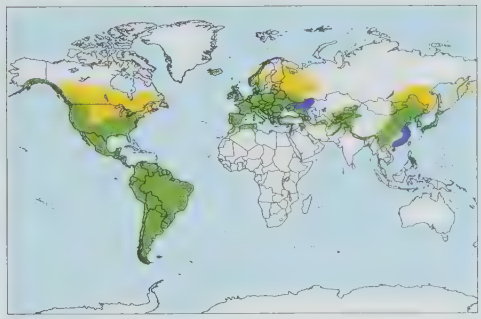
**Description**

- Plumage typically brownish, many with barring on flanks, wings, and tail, and contrasting patterns in black
- Wings short, rounded; tail short to long, usually held erect over back
- Body small to medium, ovoid to cylindrical ovoid in larger species
- Bill medium to medium-long, slender, pointed, slightly decurved
- Head medium to large; neck short, thick
- Legs and feet medium length, stout; toes with long claws
- Sexes similar



Boucard's Wren, *Campylorhynchus jocosus*. Teotitlán del Valle, Oaxaca, Mexico. © Ian Davies.





**Habitat** Wrens live in most terrestrial habitats of the New World, from scree fields to marshes and dense tropical rainforests to grasslands and deserts.

**Food** Wrens feed primarily on insects of a great variety of sizes, but they include other invertebrates (spiders, millipedes, snails, scorpions) and small vertebrates in their diets as well. They will also take lesser quantities of berries and seeds, and even seaweed, especially when animal prey are scarce. Wrens forage either by gleaning insect prey from branches and leaves, usually in dense undergrowth, or by snatching prey on the ground, and some are army ant followers, catching prey escaping from the advancing ants.

**Breeding** Most wrens are monogamous with biparental care, and several Neotropical species, particularly *Campylorhynchus* wrens, are cooperative breeders. Some species, especially those of highly productive marshes and grasslands, have a polygynous mating system. Across this social spectrum, wrens have a characteristic habit of constructing multiple nests, with males in some species building up to 20 nests in a single breeding season. Quite a few species nest in tree-holes, abandoned burrows in insect nests, or rock crevices, and these species build an open cup nest, whereas those species that build a nest outside tend to build a domed globe nest with a side entrance, often placed in spiny branches or near a hymenopteran nest for protection. Females typically lay 2 to 9 eggs.

These jaunty songbirds occupy nearly every habitat except tundra in the New World, but are represented in the Old World by only a single, temperate woodland species. Seldom shy, wrens are often seen with their characteristically short tails cocked over their backs. With diverse mating systems of monogamy, polygyny, and cooperative breeding, they have nest-building habits equally diverse, from all sorts of cavities to free-standing nests placed in trees near protective colonies of ants or wasps. Their energetic nature and assertiveness are probably best reflected in their sonic output, which seems totally out of proportion to their body size. Some tropical species take their singing in atonal directions not explored by any other birds, and many are accomplished duetters.



White-headed Wren, *Campylorhynchus albobrunneus*. Las Tángaras Reserve, Chocó, Colombia. © Ian Davies.

Both male and female construct the nest. Only the female incubates the eggs. In polygynous species, males contribute very little, if anything, to feeding chicks. In monogamous wrens, both parents feed the young. In cooperatively breeding species, helpers are active in nest construction and territory defense, as well as in feeding the chicks. Incubation takes 12 to 23 days, with shorter durations in the smaller species, and chicks leave the nest after 12 to 21 days in the nest. Fledglings are fed by the parents for about two weeks in temperate migratory species, but parental care continues for many months in tropical sedentary species.

**Conservation** Wren species are capable of very fine distinctions in their habitat preferences, and this has become a liability for the group; 11 species (13%) are of current conservation concern (3 NT, 3 VU, 2 EN, 3 CR). The three critically endangered species are all Colombian restricted-range species: the Santa Marta Wren *Troglodytes monticola* is limited to páramo habitat in the high Santa Marta mountains on the northern edge of the country; Niceforo's Wren *Thryothorus nicefori* and Munchique Wood Wren *Henicorhina negreti* are both limited to very small and scattered ranges in the Andes, where the former's low-elevation *Acacia* habitat is threatened by fire and grazing by domestic goats and the latter's high cloud-forest habitat is threatened by climate change. It is unlikely that any of these have global populations of more than a few hundred individuals. The two endangered wrens are not much better off. Apolinar's Wren *Cistothorus apolinari* has a tiny and fragmented range in high Andean wetlands of Colombia where it is threatened by habitat conversion and the recent spread of Shiny Cowbird *Molothrus bonariensis* into its range. The Zapata Wren *Ferminia cerverai*, which has a very tiny range limited to the Zapata Swamp in southwest Cuba, is threatened by burning of habitat and predation by introduced mongooses.

**Relationships** The wrens are part of the certhioid radiation of oscine passerines (Alström *et al.* 2013a, Alström *et al.* 2014, Barker 2014). Within this radiation, Troglodytidae appears to be sister to Polioptilidae (Barker 2004, Barker *et al.* 2004, Alström *et al.* 2006, Zuccon *et al.* 2006, Reddy & Cracraft 2007, Johansson *et al.* 2008b). The wrens and gnatcatchers together are sister to either Sittidae or Certhiidae (Barker 2004, Johansson *et al.* 2008b, Alström *et al.* 2013a), or to the clade made up of Certhiidae and Sittidae together (Barker *et al.* 2004, Zuccon *et al.* 2006, Reddy & Cracraft 2007). *Donacobius* was previously placed with the wrens owing to its similarities to *Campylorhynchus* wrens, but molecular studies have since made it clear that its affinities are outside the certhioid radiation, where it is now the sole member of the Donacobiidae (Alström *et al.* 2006, Johansson *et al.* 2008b).



Marsh Wren, *Cistothorus palustris*. San Jacinto Wildlife Area, California, USA. © Mark A. Chappell.



Munchique Wood-Wren, *Henicorhina negreti*. Las Tángaras Reserve, Chocó, Colombia. © Francesco Veronesi.



Yucatán Wren, *Campylorhynchus yucatanicus*. Río Lagartos, Yucatán, Mexico. © Ian Davies.



*SALPINCTES*
1 species

*S. obsoletus*
American Rock Wren



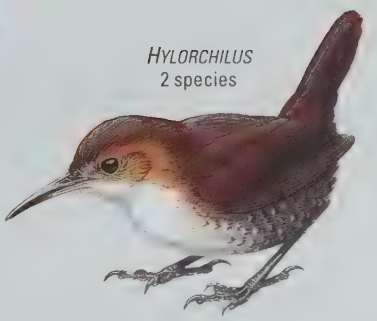
*MICROCERCULUS*
4 species

*M. bambla*
Wing-banded Wren



*CATHERPES*
1 species

*C. mexicanus*
Canyon Wren



*HYLORCHILUS*
2 species

*H. navai*
Nava's Wren



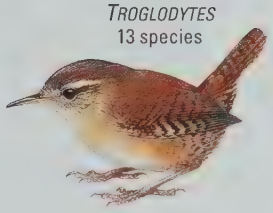
*ODONTORCHILUS*
2 species

*O. cinereus*
Tooth-billed Wren



*FERMINIA*
1 species

*F. cerverai*
Zapata Wren



*TROGLODYTES*
13 species

*T. troglodytes*
Northern Wren



*THRYORCHILUS*
1 species

*T. browni*
Timberline Wren



*CISTOTHORUS*
4 species

*C. platensis*
Sedge Wren



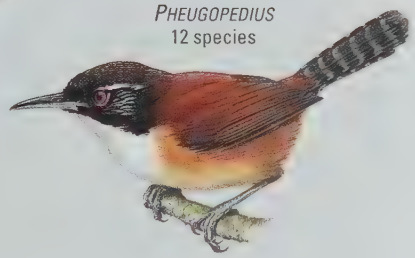
*THRYOMANES*
3 species

*T. bewickii*
Bewick's Wren



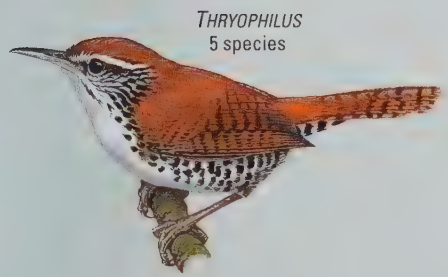
*CAMPYLORHYNCHUS*
13 species

*C. rufinucha*
Rufous-naped Wren



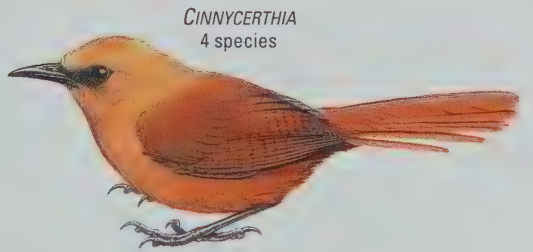
*PHEUGOPEDIUS*
12 species

*P. coraya*
Coraya Wren



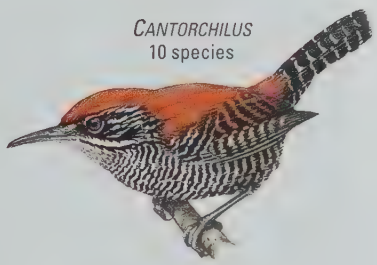
*THRYOPHILUS*
5 species

*T. pleurostictus*
Banded Wren



*CINNYCERTHIA*
4 species

*C. unirufa*
Rufous Wren



*CANTORCHILUS*
10 species

*C. semibadius*
Riverside Wren



*UROPSILA*
1 species

*U. leucogastra*
White-bellied Wren



*HENICORHINA*
4 species

*H. leucosticta*
White-breasted Wood-Wren



*CYPHORHINUS*
3 species

*C. phaeocephalus*
Song Wren



*THRYOTHORUS*
1 species

*T. griseus*
Gray Wren

# Order: Passeriformes, Muscicapoid Oscines

## Families: Buphagidae, Sturnidae, Mimidae, Cinclidae, Turdidae, Muscicapidae

Muscicapoidea is a relatively well-defined clade of families that includes oxpeckers, starlings, mockingbirds, dippers, and the two very large twin families of thrushes and Old World flycatchers. Within the group, the thrushes are sister to the Old World flycatchers, and they together are in turn sister to the oxpeckers, mockingbirds, and starlings. The dippers are sister to all the rest (Barker *et al.* 2004, Cibois & Cracraft 2004, Lovette & Rubenstein 2007, Johansson *et al.* 2008b).



Nilgiri Blue Robin, *Brachypteryx major* Nilgiri Mountains, Tamil Nadu, India © Varun HB

Passeriformes, Muscicapoid Oscines

# CINCLIDAE
## Dippers

1 genus • 5 species

**Related Families** Turdidae (thrushes), Muscicapidae (Old World flycatchers and chats), Mimidae (mockingbirds and thrashers), Sturnidae (starlings and mynas)

**Similar Birds** Sandpipers (Scolopacidae), cinclodes (Furnariidae), wrens (Troglodytidae)

**Description**
- Plumage dominated by earth tones; some species uniform in color, others with large contrasting patches of white; plumage dense, with dense down undercoat
- Wings short, pointed; tail short
- Body small to medium, ovoid, compact
- Bill short to medium, straight, slender
- Head medium-sized; neck short, thick
- Legs, toes long and thick; claws short, with the middle toe sometimes pectinate
- Sexes similar

**Habitat** Dippers live in and around fast-flowing, rocky streams, usually at higher elevations. Occasionally, especially in winter, they occur at lower altitudes along slower-moving streams.

**Food** Cinclids feed mostly on aquatic larval insects but will regularly take larval fish, fish eggs, and freshwater crabs. Dippers dive to find food and can stay submerged for 20 seconds or longer.

**Breeding** Dippers are mostly monogamous, although polygyny is not rare. The nest of all dippers is a large, globular, domed structure constructed mainly of moss. Nests are often placed on cliff ledges or along the steep banks of streams. Some nests are famously located behind waterfalls, where the parents fly straight through the water to get to the nest. Female dippers lay 2 to 6 white eggs. Both parents build the nest, although only the female incubates the eggs and broods the chicks. Both parents feed the young, and birds that are feeding young will forage more by diving than at other times of the year. Incubation takes 16 to 17 days and the nestlings leave the nest after 20 to 28 days. The fledglings are fed by both parents for up to two weeks post-fledging.

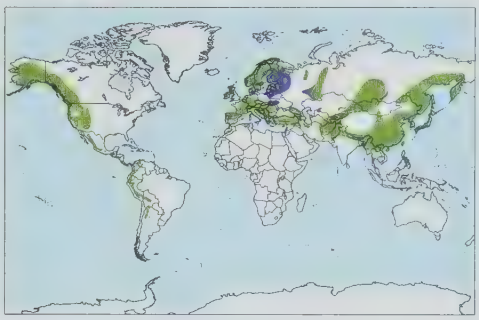


Brown Dipper, *Cinclus pallasii*.
Dodina Bridge, Wang Chhu, Thimphu, Bhutan. © Jon Irvine.

**Conservation** Changes in watershed management are the main threat facing the one cinclid species (20%) at risk (1 VU). The Rufous-throated Dipper *Cinclus schulzi* has a highly restricted range in the Andes of Argentina and Bolivia. Much of the population is fragmented and declining, because of stream changes from deforestation, mining, agriculture, hydroelectric projects, and competition with introduced trout.

**Relationships** The dippers are part of the superfamily Muscicapoidea of oscine passerines (e.g., Alström *et al.* 2014). Within this superfamily, Cinclidae is sister to the clade made up of Turdidae plus Muscicapidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Fuchs *et al.* 2006b, Zuccon *et al.* 2006, Reddy & Cracraft 2007, Johansson *et al.* 2008b) or in a polytomy with these two groups plus the clade made up of Mimidae plus Sturnidae (Treplin *et al.* 2008).





Dippers are the only truly aquatic songbirds, spending their entire lives along fast-flowing streams. Unique among songbirds, dippers dive underwater and walk along the submerged streambed with long, strong legs and feet in search of aquatic invertebrates that cling to rocks. They have several adaptations for this challenging life, including thick, uniform feathering, with no naked skin between feather tracts as in other passerines, a large oil gland for waterproofing, and flaps over their nostrils. Dippers never wander far from streams, shifting downstream to still-open waters if winter conditions are especially harsh, but as soon as the ice is gone they wander back up the streams, heralding a new breeding season with their wren-like songs cascading off the rocks.



Brown Dipper, *Cinclus pallasii*. Wulai, Taiwan. © Francesco Veronesi.

*CINCLUS*
5 species



*C. cinclus*
White-throated Dipper

# BUPHAGIDAE

Oxpeckers

1 genus • 2 species

Related Families Mimidae (mockingbirds and thrashers), Sturnidae (starlings and mynas)

Similar Birds Mynas (Sturnidae)

Description
- Plumage gray-brown, becoming lighter and buffier toward the belly
- Wings medium-long; tail medium-long, stiffened
- Body medium-sized, elongate ovoid
- Bill medium length, slightly inflated, bright red or red-and-yellow, laterally compressed at tip
- Head medium-sized, with red eyes; neck medium length and thickness
- Legs, feet short and stout; toes with short sharp claws
- Sexes similar

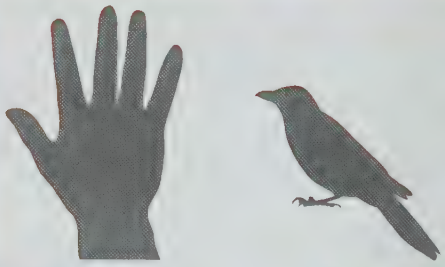
Habitat The oxpeckers live in open habitats, from grasslands to savanna, wherever large herbivores are found.

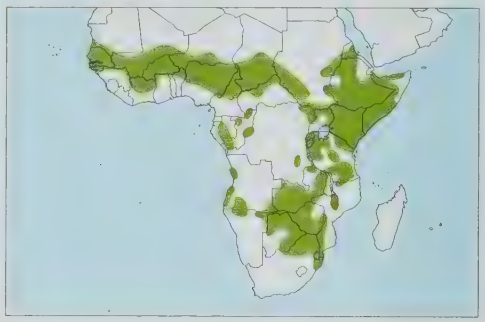
Food Buphagids feed almost exclusively from the large mammals of Africa, picking off ticks, dead skin, and blood, among other things. Their overlapping bill tip allows for easier removal of ticks and other ectoparasites from the hides of large mammals. Some argue that oxpeckers don't make much of a difference in the ectoparasite load of mammals, and instead are more of a nuisance, aggravating wounds to feed on blood.

Breeding Oxpeckers appear to be monogamous with biparental care and cooperative breeding is common. They nest in cavities, which are lined with grass and animal hair. Females typically lay 2 or 3, and occasionally as many as 5, eggs. Both male and female share the duties of nest construction, incubation, and feeding young. Helpers most often assist with feeding young, but have also been observed adding material to nests. Incubation takes about 13 days, and the nestlings are in the nest for 25 to 30 days. Apparently, nothing is reported about post-fledging parental care.



Red-billed Oxpecker, *Buphagus erythrorhynchus*. Bela-Bela, Limpopo, South Africa. © Albie Venter.





The oxpeckers are lanky brown passerines that feed on ectoparasites and wounds found on large African mammals. Although elephants and some antelope species will not tolerate them, these birds can often be seen foraging on the other large African megafauna, using their long stiffened tails for support as woodpeckers do while climbing trees. All aspects of their lives are entangled with their mobile large-mammal habitats. Oxpeckers spend the entire day on their hosts, feeding, sunbathing, and snoozing. They even defecate off the side of their perch, and sometimes take a drink at the waterhole while still gripping their hosts' legs. While breeding, which they often perform cooperatively, they even make their nests out of mammal hair and dung.

Conservation Neither buphagid species is of immediate conservation concern.

Relationships Buphagidae is part of the muscicapoid radiation (Alström *et al.* 2014). Within this group, the oxpeckers have often been allied with Sturnidae, and have sometimes been placed within it. Molecular phylogenetic studies have shown conclusively, however, that Buphagidae is sister to a group that includes both Sturnidae and Mimidae (Cibois & Cracraft 2004, Zuccon *et al.* 2006, Lovette & Rubenstein 2007).



Red-billed Oxpecker, *Buphagus erythrorhynchus*. Kruger NP, South Africa. © Hugh Chittenden.

*BUPHAGUS*
2 species



*B. africanus*
Yellow-billed Oxpecker

Passeriformes, Muscicapoid Oscines

# STURNIDAE
## Starlings and Mynas

33 genera • 115 species

**Related Families** Mimidae (thrashers and mockingbirds)

**Similar Birds** Blackbirds (Icteridae), honeyeaters (Meliphagidae), dollarbirds (Coraciidae), cotingas (Cotingidae)

**Description**
- Plumage boldly patterned in most, many with black, glossy, or iridescent patches and contrasts in white or yellow
- Wings medium-long, pointed; tail short to very long and graduated
- Body medium to large, cylindrical ovoid
- Bill mostly medium length, straight, slender to stout
- Head medium-sized; neck medium thickness and length
- Legs medium-long, and legs and feet stout
- Males more brightly colored than females in some species

**Habitat** Sturnids live in a wide variety of habitats, from arid savanna and scrubland, farmland, and grasslands through urban areas to temperate and tropical forests.

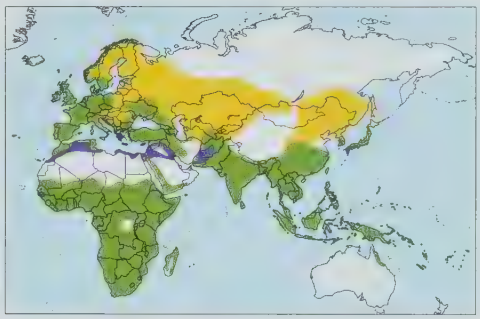
**Food** The diets of this family are highly diverse, and many species may be most accurately described as omnivorous, taking everything from nectar and many types of fruit to insects and small vertebrate prey, including fish and bird eggs. Though certainly some in this diverse group are dietary specialists, most are probably food opportunists.

**Breeding** Starlings and mynas are typically monogamous, although some species can be facultatively polygynous. Among the monogamous starlings, a number are cooperative breeders, especially in species nesting in the seasonally harsh African savanna. Many starlings and mynas are cavity-nesters, with most using cavities that had been previously excavated by woodpeckers, barbets, and others. Some, however, build nests in the shape of open cups or globes. The nest itself, whether built inside a cavity or not, is typically constructed of grass, leaves, twigs, and other plant materials, sometimes including mud. Sturnids typically lay 1 to 6 eggs. In many starlings and mynas, both sexes are active in nest construction, incubation, and feeding the chicks, but in many of the African species, only the female incubates. In cooperatively breeding species, helpers participate only in feeding the chicks; they generally take no part in nest construction or incubation. Incubation takes about 13 to 17 days, and nestlings are in the nest for about 16 to 28 days. The larger mynas are on the long end of both of these periods. After they leave the nests, fledglings are fed by parents for a week to many months.



Brahminy Starling, *Sturnia pagodarum*. Laem Pak Bia, Phetchaburi, Thailand. © Alex Vargas.





Many people know these birds best from the few species that have been introduced all over the world, and most are surprised to learn of their tremendous variety in Africa and Asia. On average mynas are heavier and stockier than starlings, but the huge variation in body proportions in this family blurs the distinction. Dark-colored species predominate in both groups, but some species are boldly colored in yellows and purples, often iridescent, and many possess bizarre wattles, crests, and long ornamental tails. Several are accomplished vocalists, renowned for their powers of mimicry. Many starlings pry open the substrate with their long, straight bills while foraging, allowing them to see down into stems and sod in pursuit of their invertebrate prey.



Southern Hill Myna, *Gracula indica*. Kotagiri, Nilgiri Mountains, Tamil Nadu, India. © Varun HB.

**Conservation** Habitat loss and introduced predators are the main threats facing sturnids, 17 species of which (14%) are of conservation concern (9 NT, 4 VU, 1 EN, 3 CR). Many of these threatened species have restricted ranges, some occurring only on small islands, where these threats are particularly harmful. The critically endangered Bali Myna *Leucopsar rothschildi* was naturally found only on the island of Bali, where overwhelming pressure from illegal trapping for the cage-bird trade has made a sustainable wild population impossible. The species is apparently being sustained only by captive breeding in zoos and private collections, and introductions to non-native islands with smaller human populations are being attempted. A similar situation exists in nearby islands for the only slightly less rare Black-winged Myna *Acridotheres melanopterus*. The critically endangered Pohnpei Starling *Aplonis pelzelni* is limited to a single small island in the South Pacific, where it has very rarely been seen in surveys and is feared ex-

tinct. Habitat loss, hunting, and introduced rats are all likely factors in its demise. A number of other sturnids, all Pacific island endemics, have gone extinct in the recent past, including the Norfolk Island Starling *Aplonis fusca*, Mysterious Starling *Aplonis mavornata* from a single island in the Cook Islands, and Reunion Starling *Fregilupus varius*.

**Relationships** The starlings and mynas are part of the superfamily Muscicapoidea of the oscine passerines (Alström *et al.* 2014). Within this superfamily, Sturnidae has consistently been found to be sister to Mimidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Zuccon *et al.* 2006, Lovette & Rubenstein 2007, Reddy & Cracraft 2007, Johansson *et al.* 2008b, Treplin *et al.* 2008). The Philippine *Rhabdornis* creepers, at one time placed in their own family, are embedded within Sturnidae (Cibois & Cracraft 2004, Zuccon *et al.* 2006, Lovette & Rubenstein 2007) and are often accorded their own subfamily, Rhabdornithinae (Cracraft 2014).



Amethyst Starling, *Cinnyricinclus leucogaster*. uMkhuze Reserve, KwaZulu-Natal, South Africa. © Francesco Veronesi.

## Subfamily **STURNINAE** (1 of 2)

*STURNUS*
2 species



*S. vulgaris*
Common Starling

*CREATOPHORA*
1 species



*C. cinerea*
Wattled Starling

*PASTOR*
1 species



*P. roseus*
Rose-colored Starling

*AGROPSAR*
2 species



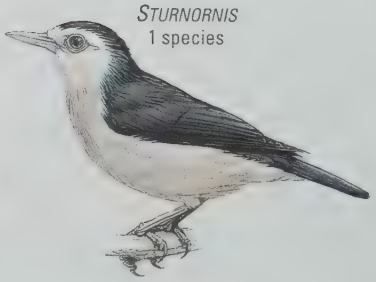
*A. philippensis*
Red-cheeked Starling

*GRACUPICA*
2 species



*G. contra*
Asian Pied Starling

*STURNORNIS*
1 species



*S. albofrontatus*
White-faced Starling

*LEUCOPSAR*
1 species



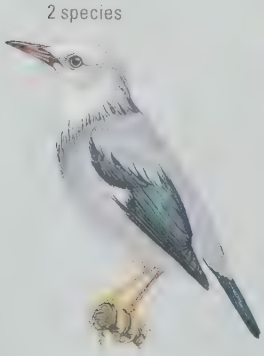
*L. rothschildi*
Bali Myna

*STURNIA*
4 species



*S. pagodarum*
Brahminy Starling

*SPODIOPSAR*
2 species



*S. sericeus*
Red-billed Starling

*ACRIDOTHERES*
10 species



*A. tristis*
Common Myna

*ONYCHOGNATHUS*
11 species



*O. morio*
Red-winged Starling

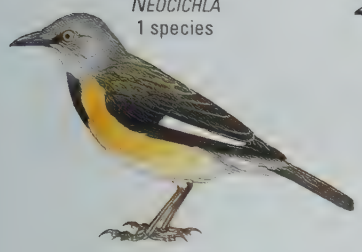
*SAROGLOSSA*
1 species



*S. spilopterus*
Spot-winged Starling

## Subfamily STURNINAE (2 of 2)

*NEOCICHLA*
1 species



*N. gutturalis*
White-winged Babbling Starling

*GRAFISIA*
1 species



*G. torquata*
White-collared Starling

*SPECULIPASTOR*
1 species



*S. bicolor*
Magpie Starling

*PHOLIA*
1 species



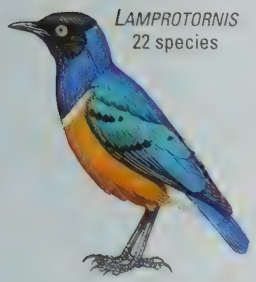
*P. sharpii*
Sharpe's Starling

*POEOPTERA*
4 species



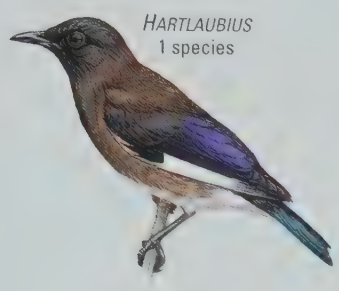
*P. kenricki*
Kenrick's Starling

*LAMPROTORNIS*
22 species



*L. superbus*
Superb Starling

*HARTLAUBIUS*
1 species



*H. auratus*
Madagascar Starling

*CINNYRICINCLUS*
1 species



*C. leucogaster*
Amethyst Starling

*HYLOPSAR*
2 species



*H. purpureiceps*
Purple-headed Glossy Starling

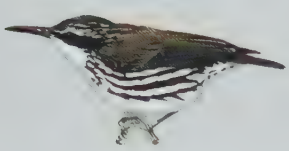
*NOTOPHOLIA*
1 species



*N. corrusca*
Black-bellied Glossy Starling

## Subfamily RHABDORNITHINAE

*RHABDORNIS*
3 species



*R. mystacalis*
Stripe-headed Rhabdornis

## Subfamily MAINATINAE

*BASILORNIS*
3 species



*B. galeatus*
Helmeted Myna

*GOODFELLOWIA*
1 species



*G. miranda*
Apo Myna

*STREPTOCITTA*
2 species



*S. albicollis*
White-necked Myna

*SARCOPS*
1 species



*S. calvus*
Coleto

*MINO*
3 species



*M. dumontii*
Yellow-faced Myna

*GRACULA*
5 species



*G. ptilogenys*
Sri Lanka Hill Myna

*AMPELICEPS*
1 species



*A. coronatus*
Golden-crested Myna

*ENODES*
1 species



*E. erythrophris*
Flame-browed Starling

*SCISSIROSTRUM*
1 species



*S. dubium*
Grosbeak Starling

*APLONIS*
21 species



*A. metallica*
Shining Starling

# MIMIDAE
## Mockingbirds and Thrashers

10 genera • 34 species

**Related Families** Sturnidae (starlings and mynas)

**Similar Birds** Shrikes (Laniidae), large flycatchers (Tyrannidae), solitaires (Turdidae), laughing-thrushes (Leiothrichidae), bulbuls (Pycnonotidae)

**Description**
- Plumage generally gray or brown, less commonly blue or black; thrashers often with prominent streaking below, others more uniformly colored
- Wings medium-long; tail long
- Body size medium, cylindrical ovoid, with horizontal posture
- Bill medium to long, slender, often decurved (extremely so in some *Toxostoma* thrashers)
- Head small to medium-sized; neck medium-thick
- Legs and toes long, robust
- Sexes similar

**Habitat** Mockingbirds and thrashers live in both second-growth and primary forest habitats, as well as open woodlands, shrublands, and desert. Dense cover in some part of the habitat is essential for most species, especially the thrashers.

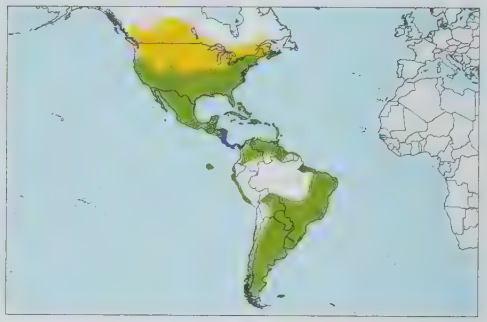
**Food** Mimids are catholic in their diets, which include insects and other arthropods, small vertebrates, eggs, and fruit. During some seasons, fruit may make up a large proportion of the diet.

**Breeding** Most mimids are territorial and monogamous breeders. Galapagos species in the genus *Nesomimus*, and perhaps to a lesser degree some of the *Mimus* species from South America, are cooperative breeders, living in groups of up to ten adult individuals. The typical mimid nest is a bulky open cup constructed of twigs, grass, and finer materials such as plant fibers and rootlets. In many species, the nest is placed in a very dense bush or, in the case of the desert species, in a cactus. Clutch size within the family varies from 2 to 7 eggs. In many species, both male and female participate in all aspects of parental care, from nest construction to incubation and feeding nestlings. However, in some species, only the female constructs the nest and incubates. In cooperatively breeding *Nesomimus*, helpers assist mainly in the provisioning of young and defense of territories. Mimid incubation takes 12 to 14 days, and the young leave the nest about 10 to 15 days after hatching. The fledglings are fed by the parents after they leave



Black Catbird, *Melanoptila glabrirostris*.
Cozumel Island, Quintana Roo, Mexico. © Ian Davies.





These long-tailed songsters are common denizens of the open habitats of the New World, reaching their greatest diversity in the thrasher radiation of southwestern North America. Though they generally sing their throaty whistled songs from exposed perches, all but the mockingbirds typically disappear into the undergrowth and shrubs at other times, where they forage on or near the ground for invertebrate prey. Many are accomplished vocal mimics, the best adding syllables from dozens of local species—and non-avian sounds such as frog calls and even mechanical sounds—to their repertoires. The mockingbirds of the Galapagos are like no others, having radiated into several species that are fearless, cooperatively breeding, flock-living, roving opportunists.



Curve-billed Thrasher *Toxostoma curvirostre*. Green Valley, Arizona, USA. © Mark A. Chappell.

the nest, for at up to three weeks in non-cooperative species, and much longer in *Nesomimus*.

**Conservation** Habitat loss is the main threat facing the eight mimids (24%) that are of conservation concern (1 NT, 2 VU, 2 EN, 3 CR). The three critically endangered species are all extremely range-restricted: the Floreana Mockingbird *Nesomimus trifasciatus* from a single island in the Galapagos, and the Socorro Mockingbird *Mimus graysoni* and Cozumel Thrasher *Toxostoma guttatum*, both from single islands off the coast of Mexico. The Cozumel Thrasher was almost exterminated after Hurricane Gilbert hit the island in 1988. Since that time, very few reports of the species have surfaced.

**Relationships** Mimidae is part of the muscicapoid radiation of oscine passerines (Alström *et al.* 2014). Within this group, Mimidae is sister to Sturnidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Zuccon *et al.* 2006, Lovette & Rubenstein 2007, Reddy & Cracraft 2007, Johansson *et al.* 2008b, Treplin *et al.* 2008), and these two taken together are sister to Buphagidae (Cibois & Cracraft 2004, Zuccon *et al.* 2006, Lovette & Rubenstein 2007).



Hood Island Mockingbird, *Mimus macdonaldi*. Punta Suárez, Española Island, Galapagos. © Nick Athanas.



# TURDIDAE
## Thrushes

20 genera • 153 species

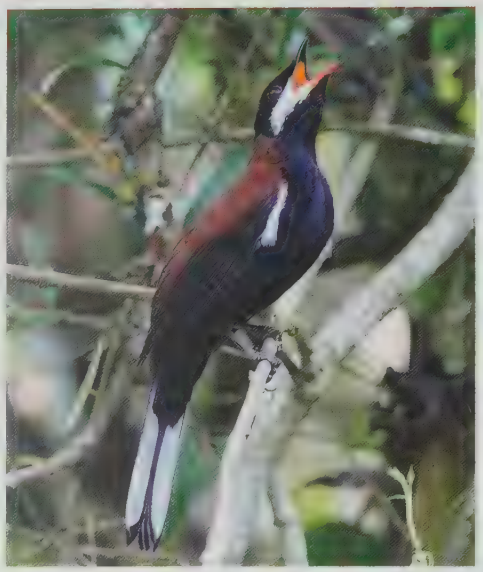
Related Families Muscicapidae (Old World flycatchers and chats), Cinclidae (dippers)

Similar Birds Old World flycatchers and allies (Muscicapidae), mockingbirds and thrashers (Mimidae), cinclodes and horneros (Furnariidae)

Description
- Plumage variable; colors ranging from browns and grays to blue, with reddish brown very common; many with spotted breasts as juveniles, some as adults
- Wings and tail medium to medium-long
- Body medium to medium-large, cylindrical ovoid, elongate
- Bill medium to medium-long, slender
- Head medium to large; neck medium length, thick
- Legs medium-long; feet large
- Males more brightly colored and boldly patterned than females in some

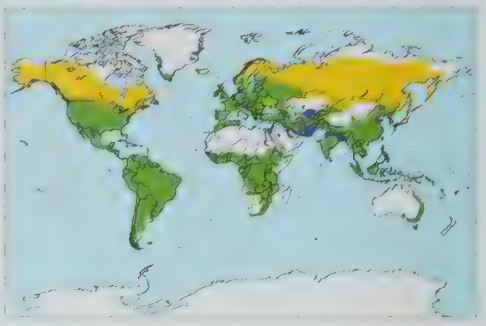
Habitat The habitat of thrushes varies, from dense forests to grasslands, but they usually avoid extremely arid habitats.

Food Thrushes feed on a wide variety of invertebrates, including insects, worms, and spiders, and various small fruits. Although some will also take small vertebrates, these rarely constitute a sizable proportion of the diet of any thrush species. During the winter months, fruit becomes an important food item for species wintering in temperate regions. Many thrushes forage for invertebrate prey on the ground by gleaning or probing the top soil layer. Other thrushes, like the bluebirds and solitaires, actively sally for insects. Some otherwise terrestrial thrushes flycatch occasionally.



White-eared Solitaire, *Entomodestes leucotis*. Villa Rica-Oxapampa Road, Pasco region, Peru. © Nick Athanas.





Breeding Turdids are monogamous with biparental care, and some species breed cooperatively. Western Bluebirds *Sialia mexicana*, for instance, frequently have helpers that aid in defending territory and feeding chicks. As with most cooperatively breeding species, the majority of helpers are males retained from previous nesting of the breeding pair. The nests of turdids typically consist of a woven cup of grass and other vegetative material, with mud being added in some species. Species living in close proximity to humans also incorporate objects like rope and ribbon into their nests. Some will also decorate their nests with moss and epiphytes. The placement of nests varies substan-

Few distinctions in the world of bird families are as maddening as that between the thrushes and the Old World flycatchers: both families have large numbers of species, and morphological diversification over the millennia has created a great deal of overlap between them. Thrushes are generally long-bodied and strong-legged, with full chests, largish heads, and mid-sized bills. Most species are comfortable on the ground, where they often hop after buried invertebrate prey. Though they are most often attired in plumages of earth tones, with accents in rufous and contrasting streaks and spots of black and gray, some species are partially or entirely blue. Many have complex whistled and trilled songs with an ethereal resonance.



Gray-winged Blackbird, *Turdus boulboul*. Doi Lang, Thailand. © Michael Gillam.



Russet-tailed Thrush, *Zoothera heinei*. O'Reilly's Rainforest Resort, Brisbane, Australia. © Graeme Chapman.

tially; for example, bluebirds (*Sialia*) typically nest in tree cavities or nest boxes, whereas the solitaires typically nest on the ground or in a niche in a bank or trunk. Female turdids typically lay 1 to 7 eggs. Only female thrushes build the nest, gathering nesting material and choosing a nest site. Only females incubate as well, but both male and female provision the chicks, the male often doing the bulk of the work at that stage. Incubation generally takes 11 to 15 days. Nestlings leave after 11 to 19 days in the nest (usually less than 15), and the young are fed by the parents for 10 to 25 days after they leave the nest.

**Conservation** Habitat loss, introduced predators, and epidemic disease are the main threats facing turdids, 39 species of which (25%) are of conservation concern (23 NT, 11 VU, 2 EN, 3 CR). The *Myadestes* solitaires of the Hawaiian Islands include the critically endangered Puaiohi *Myadestes palmeri* and Olomao *M. lanaiensis*, the latter of which is probably extinct, likely joining two others (*M. myadestinus* and *M. woahensis*) that went extinct with extensive clearing of native forests and introduction of mosquitoes carrying malaria to the islands. The critically endangered Taita Thrush *Turdus helleri* is restricted to three tiny and isolated forest fragments in the Taita Hills in southern Kenya; severe human population pressure on the remaining forest has intensified efforts to halt habitat destruction and undertake reforestation with native species. The endangered La Selle Thrush *Turdus swalesi* is restricted to the island of Hispaniola, where extensive clearance of broadleaf forest has left the species with a very limited and fragmented range. A similar situation faces the endangered Spotted Ground-thrush *Zoothera guttata* in southern Africa, where both the breeding and wintering grounds for this southern migrant are scattered forest remnants that are under pressure from timber harvesting and pollution by mining operations.

**Relationships** Turdidae is part of the superfamily Muscicapoidea of oscine passerines (Alström *et al.* 2014), within which it is sister to Muscicapidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Zuccon *et al.* 2006, Johansson *et al.* 2008b, Treplin *et al.* 2008, Sangster *et al.* 2010). The clade of Turdidae plus Muscicapidae taken together is in turn sister to Cinclidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Fuchs *et al.* 2006b, Zuccon *et al.* 2006, Reddy & Cracraft 2007, Johansson *et al.* 2008b, Treplin *et al.* 2008). The family limits between Turdidae and Muscicapidae have been uncertain, with members of each family at times being classified with the other. For example, the Saxicolini (which includes the *Oenanthe* wheatears, *Saxicola* stonechats, *Luscinia* robins, and *Monticola* rock thrushes) and the *Copsychus* shamas have often been grouped with Turdidae, but they are presently classified as part of Muscicapidae on the basis of molecular phylogenetic studies (Wink *et al.* 2002, Cibois & Cracraft 2004). Within Turdidae, the two main subfamilies of solitaires (Myadestinae) and thrushes (Turdinae) are clearly delineated by molecular studies (Olsson & Alström 2013, Sangster *et al.* 2010).

Subfamily **MYADESTINAE**

*SIALIA*
3 species



*S. sialis*
Eastern Bluebird

*GRANDALA*
1 species



*G. coelicolor*
Grandala

*NEOCOSSYPHUS*
2 species



*N. poensis*
White-tailed Ant Thrush

*STIZORHINA*
2 species



*S. fraseri*
Rufous Flycatcher-Thrush

*MYADESTES*
11 species



*M. occidentalis*
Brown-backed Solitaire



*GEOMALIA*
1 species

*G. heinrichi*
Geomalia



*ZOOTHERA*
14 species

*Z. dauma*
Common Scaly Thrush



*IXOREUS*
1 species

*I. naevius*
Varied Thrush



*ENTOMODESTES*
2 species

*E. coracinus*
Black Solitaire



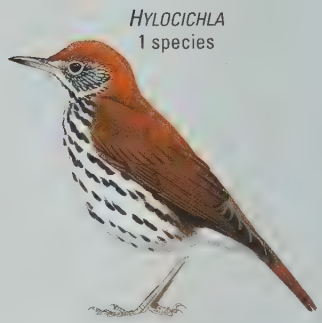
*CICHLOPSIS*
1 species

*C. leucogenys*
Rufous-brown Solitaire



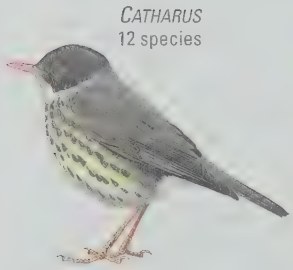
*RIDGWAYIA*
1 species

*R. pinicola*
Aztec Thrush



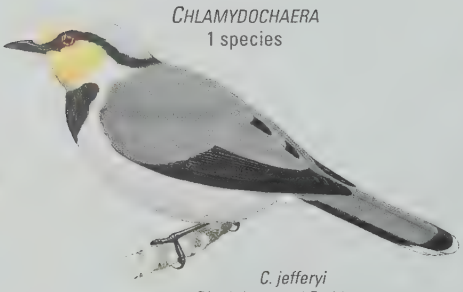
*HYLOCICHLA*
1 species

*H. mustelina*
Wood Thrush



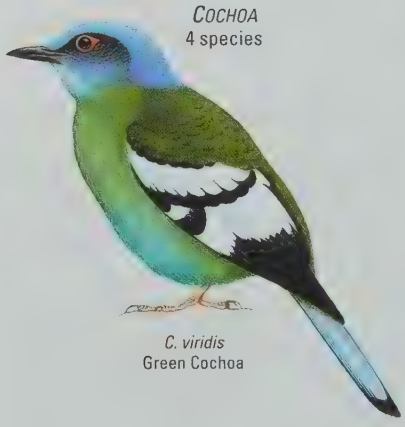
*CATHARUS*
12 species

*C. dryas*
Spotted Nightingale-Thrush



*CHLAMYDOCHAERA*
1 species

*C. jefferyi*
Black-breasted Fruithunter



*COCHOA*
4 species

*C. viridis*
Green Cochoa



*GEOKICHLA*
21 species

*G. erythronota*
Red-backed Thrush



*OTOCICHLA*
1 species

*O. mupinensis*
Chinese Thrush



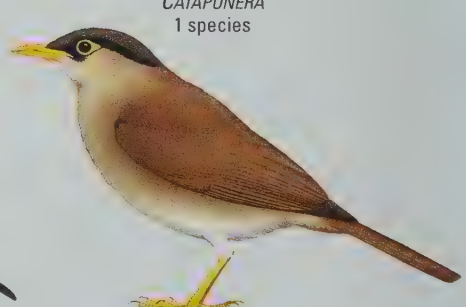
*PSOPHOCICHLA*
1 species

*P. litsitsirupa*
Groundscraper Thrush



*TURDUS*
72 species

*T. merula*
Common Blackbird



*CATAPONERA*
1 species

*C. turdoides*
Sulawesi Thrush

Passeriformes, Muscicapoid Oscines

# MUSCICAPIDAE

## Old World Flycatchers and Chats

57 genera • 298 species

**Related Families** Turdidae (thrushes), Cinclidae (dippers)

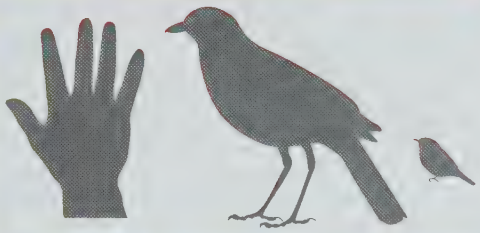
**Similar Birds** Thrushes (Turdidae), babblers (Timaliidae, Leiothrichidae, Pellorneidae), tyrant flycatchers (Tyrannidae)

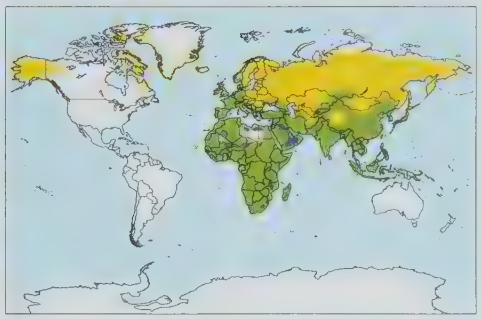
**Description**

- Plumage mostly in browns or black-and-white, with large patches of blue, rufous, or yellow in many
- Wings medium-long; tail medium-long to very long in *Enicurus*
- Body small to medium, cylindrical ovoid, with upright posture in flycatchers, horizontal posture in ground-dwelling species
- Bill short to medium, thin, dorso-ventrally flattened in some flycatchers
- Head medium-sized; neck medium to short, thick
- Legs short to medium-long in most, feet medium
- Males in some more boldly patterned and brightly colored than females



Large Niltava, *Niltava grandis*.
Doi Lang, Thailand. © Francesco Veronesi.





**Habitat** The Old World flycatchers and chats live in a vast array of habitats, including forest, grassland, scrubland, savanna, desert, and Arctic tundra.

**Food** Muscicapids feed mostly on insects and other invertebrates. In many species, especially the flycatchers, insect prey is most often caught in mid-air, although most species also take prey while gleaning from branches or by pouncing on terrestrial prey from a perch above. In quite a few species, berries and seeds are a significant part of their diet.

**Breeding** Muscicapids are primarily monogamous with biparental care. Some species are polygynous, with males mating with up to three females. Cooperative breeding is also known in a few species, with a single nesting female and up to several helpers that assist with nest-building and chick provisioning. Muscicapid nests are typically open cups or, less commonly, globes, built of various plant fibers and twigs and very often including a great deal of moss. Nest placement is highly variable; some species are obligate cavity-nesters or adopters of abandoned nests of other species, whereas others build their nests on the ground or in trees. Females typically lay 2 to 8 eggs, with smaller clutches in the tropical species. In many species, the female

The Old World flycatchers at the core of this group are upright-postured birds, a surprising number of which catch their prey by gleaning or pouncing on insects on the ground as well as sallying into mid-air. Although some have the dorso-ventrally flattened bills that we associate with flycatching in other flycatchers, most do not. Many species in this family come in the form of plucky little ground birds, most of which are lighter of build and more delicately proportioned in the legs than are the Turdidae. Scattered across this group of largely earth-toned or black-and-white birds are species representing the entire spectrum of blue plumages, from a pale teal to the most intense iridescent sapphire.



White-throated Rock Thrush, *Monticola gularis*. Khao Yai NP, Thailand. © Con Foley.

constructs the nest alone and is solely responsible for incubation, but in others, both sexes incubate. Incubation takes 11 to 18 days, and chicks leave the nest after 10 to 18 days of being cared for there. Both male and female are active in feeding the chicks, and the fledglings are fed by the parents for a week to ten weeks post-fledging.

**Conservation** For the 60 species (20%) of muscicapids at risk, habitat loss, especially deforestation, is the main threat (28 NT, 16 VU, 15 EN, 1 CR). The critically endangered Rück's Blue-flycatcher *Cyornis ruckii* has not been seen since the last of two specimens was collected in northern Sumatra in 1918. The type locality is now on the outskirts of a large city, and there is very little hope for any conservation action. Of the 15 endangered muscicapid species, three are *Sheppardia* akalats of Africa, two are *Copsychus* species (a shama from a single island in the Philippines and a magpie-robin on the Seychelles Islands), and two are *Myiornis* blue robins from southern India. All have restricted ranges with habitats beleaguered by encroaching human uses, and the island forms face challenges from introduced predators.

**Relationships** The Old World flycatchers and chats are part of the muscicapoid radiation of the oscine passerines. They are closely allied to Turdidae, and although these two groups have at times been merged together into Muscicapidae (Sibley & Ahlquist 1990), recent molecular analyses show that Muscicapidae is the strongly supported sister family to Turdidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Zuccon *et al.* 2006, Johansson *et al.* 2008b, Treplin *et al.* 2008, Sangster *et al.* 2010). These two families together are sister to Cinclidae (Barker *et al.* 2004, Cibois & Cracraft 2004, Fuchs *et al.* 2006b, Zuccon *et al.* 2006, Reddy & Cracraft 2007, Johansson *et al.* 2008b, Treplin *et al.* 2008). Within Muscicapidae, there are four main clades that are recognized as subfamilies: Muscicapinae is sister to the remaining three groups. Of the three remaining subfamilies, Saxicolinae is sister to Cossyphinae, and these taken together are in turn sister to Niltavinae (Sangster *et al.* 2010, Zuccon & Ericson 2010).



Rufous-browed Flycatcher, *Anthipes solitaris*. Fraser's Hill, Pahang, Malaysia. © Con Foley.



Chestnut-naped Forktail, *Enicurus ruficapillus*. Si Phang-Nga NP, Thailand. © Alex Vargas.



Spotted Palm Thrush, *Cichladusa guttata*. Robert's Camp, Lake Baringo, Kenya. © Nick Athanas.

## Subfamily **MUSCICAPINAE**

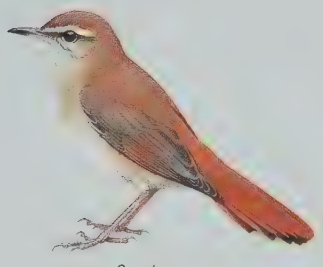
### Tribe **Copsychini**

*ALETHE*
2 species



*A. castanea*
Fire-crested Alethe

*CERCOTRICHAS*
10 species



*C. galactotes*
Rufous Scrub Robin

*NAMIBORNIS*
1 species



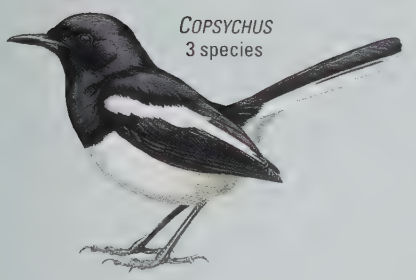
*N. herero*
Herero Chat-Flycatcher

*SAXICOLOIDES*
1 species



*S. fulicatus*
Indian Robin

*COPSYCHUS*
3 species



*C. saularis*
Oriental Magpie-Robin

*TRICHIXOS*
1 species



*T. pyrropygus*
Rufous-tailed Shama

*KITTACINCLA*
4 species



*K. malabarica*
White-rumped Shama

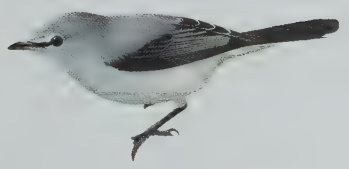
### Tribe **Muscicapini**

*MUSCICAPA*
24 species



*M. ferruginea*
Ferruginous Flycatcher

*MYIOPARUS*
2 species



*M. plumbeus*
Gray Tit-Flycatcher

*FRASERIA*
2 species



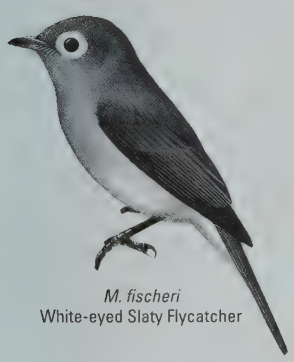
*F. ocreata*
Fraser's Forest Flycatcher

*BRADORNIS*
4 species



*B. mariquensis*
Mariqua Flycatcher

*MELAENORNIS*
7 species



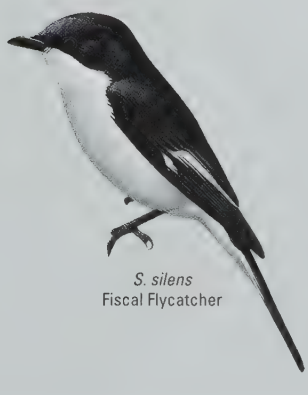
*M. fischeri*
White-eyed Slaty Flycatcher

*EMPIDORNIS*
1 species



*E. semipartitus*
Silverbird

*SIGELUS*
1 species



*S. silens*
Fiscal Flycatcher

*HUMBLOTIA*
1 species



*H. flavirostris*
Humblot's Flycatcher

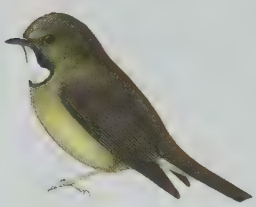
## Subfamily NILTAVINAE

*CYORNIS*
23 species



*C. banyumas*
Hill Blue Flycatcher

*ANTHIPES*
2 species



*A. monileger*
White-gorgeted Flycatcher

*NILTAVA*
6 species



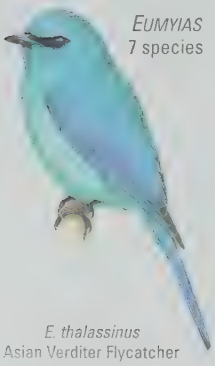
*N. sundara*
Rufous-bellied Niltava

*CYANOPTILA*
1 species



*C. cyanomelana*
Blue-and-white Flycatcher

*EUMYIAS*
7 species



*E. thalassinus*
Asian Verditer Flycatcher

*VAURIELLA*
4 species



*V. insignis*
White-browed Jungle Flycatcher

## Subfamily COSSYPHINAE

*COSSYPHA*
13 species



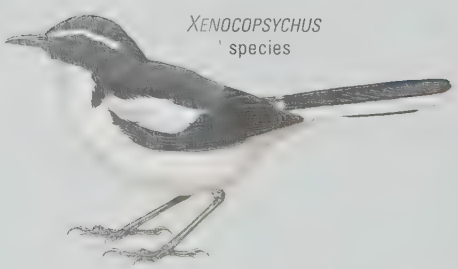
*C. heuglini*
White-browed Robin-Chat

*COSSYPHICULA*
1 species



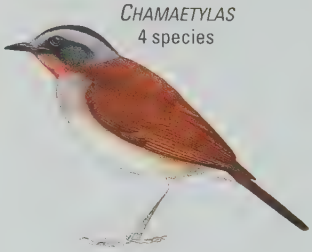
*C. roberti*
African Flycatcher-Chat

*XENOCOPSYCHUS*
1 species



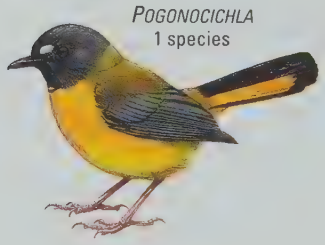
*X. ansorgei*
Angola Cave Chat

*CHAMAETYLAS*
4 species



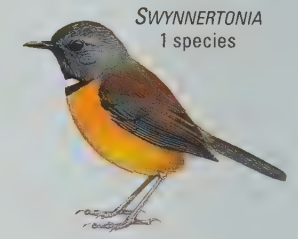
*C. poliophrys*
Red-throated Alethe

*POGONOCICHLA*
1 species



*P. stellata*
White-starred Robin

*SWYNNERTONIA*
1 species



*S. swynnertoni*
Swynnerton's Robin

*ERITHACUS*
1 species



*E. rubecula*
European Robin

*CICHLADUSA*
3 species



*C. arquata*
Collared Palm Thrush

*SHEPPARDIA*
10 species



*S. aequatorialis*
Equatorial Akalat

*STIPHRORNIS*
2 species



*S. erythrothorax*
Forest Robin

## Subfamily SAXICOLINAE (1 of 2)

*HEINRICHIA*
1 species



*H. calligyna*
Great Shortwing

*BRACHYPTERYX*
5 species



*B. hyperythra*
Rusty-bellied Shortwing

*HETEROXENICUS*
1 species



*H. stellatus*
Gould's Shortwing

*LARVIVORA*
6 species

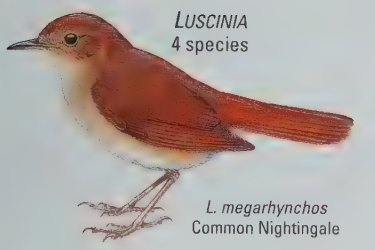


*L. akahige*
Japanese Robin

*IRANIA*
1 species

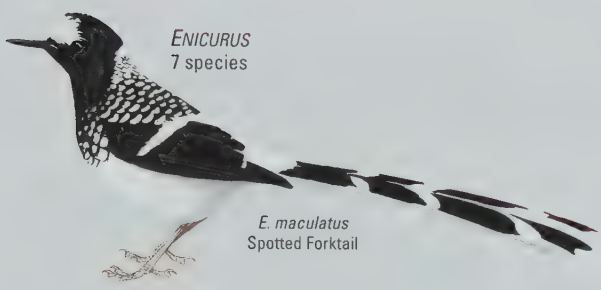


*I. gutturalis*
White-throated Robin



*LUSCINIA*
4 species

*L. megarhynchos*
Common Nightingale



*ENICURUS*
7 species

*E. maculatus*
Spotted Forktail



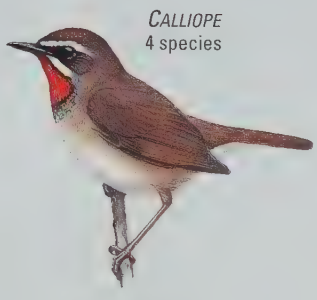
*CINCLIDIUM*
1 species

*C. frontale*
Long-tailed Blue Robin



*MYOPHONUS*
9 species

*M. caeruleus*
Blue Whistling Thrush



*CALLIOPE*
4 species

*C. calliope*
Siberian Rubythroat



*MYIOMELA*
2 species

*M. leucura*
White-tailed Blue Robin



*TARSIGER*
5 species

*T. cyanurus*
Orange-flanked Bush Robin



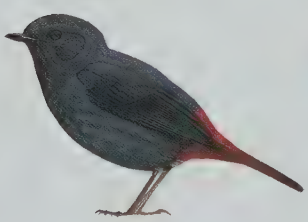
*FICEDULA*
28 species

*F. narcissina*
Narcissus Flycatcher



*PHOENICUROPSIS*
4 species

*P. schisticeps*
White-throated Redstart



*RHYACORNIS*
2 species

*R. fuliginosa*
Plumbeous Water Redstart



*CHAIMARRORNIS*
1 species

*C. leucocephalus*
White-capped Water Redstart



*PHOENICURUS*
7 species

*P. phoenicurus*
Common Redstart



*MONTICOLA*
15 species

*M. saxatilis*
Common Rock Thrush



*SAXICOLA*
11 species

*S. torquatus*
Common Stonechat



*CAMPICOLOIDES*
1 species

*C. bifasciatus*
Buff-streaked Chat



*EMARGINATA*
3 species

*E. tractrac*
Tractrac Chat



*PINAROCHROA*
1 species

*P. sordida*
Moorland Chat



*MYRMECOCICHLA*
7 species

*M. nigra*
Sooty Chat



*OENANTHE*
26 species

*O. oenanthe*
Northern Wheatear



*THAMNOLAEA*
1 species

*T. cinnamomeiventris*
Mocking Cliff Chat



*PINARORNIS*
1 species

*P. plumosus*
Boulder Chat

# Order: Passeriformes, Reguloid Oscines

## Family: Regulidae

Although traditionally the kinglets were placed in Sylvioidea, modern molecular analyses indicate that they represent an ancient lineage with no clear close relationships to any particular family or group of families (Barker *et al.* 2004, Johansson *et al.* 2008b, Alström *et al.* 2014), and they still do not have a clear position in passerine classification (Cracraft 2014). In one of the latest molecular analyses, they have a very long branch with a very short internode connecting them to the superfamilies Sylvioidea, Muscicapoidea, Certhioidea, and Bombycilloidea (Alström *et al.* 2014), while another suggests a close relationship with Bombycilloidea, with these two groups in turn sister to the large superfamily Passeroidea (Barker 2014). In short, opinions on the affinities of these tiny passerines have not yet reached any consensus, and it would seem premature to align them with one group over another.



Golden-crowned Kinglet, *Regulus satrapa*. Saskatoon, Saskatchewan, Canada. © Nick Saunders.

Passeriformes, Reguloid Oscines

# REGULIDAE
## Kinglets

1 genus · 6 species

**Related Families** No known close relatives; likely sister to a large assemblage of families

**Similar Birds** Warblers (Phylloscopidae and Parulidae), thornbills (Acanthizidae), vireos (Vireonidae)

**Description**
- Plumage dull olive-gray with eye-ring or eye-stripe; colorful crown patch
- Wings medium length, rounded; tail short
- Body very small, ovoid, compact
- Bill medium-short, thin, pointed, with distinctive single feather on each side over nares
- Head large; neck short, thick
- Legs and toes medium-long, delicate
- Sexes generally similar; females often lack distinctive patch of color on crown

**Habitat** Kinglet species tend to prefer coniferous forests, although they occupy a wide variety of forested habitats, especially during migration and during the non-breeding season. Species or subspecies that live on islands without natural conifers prefer laurels and heath.

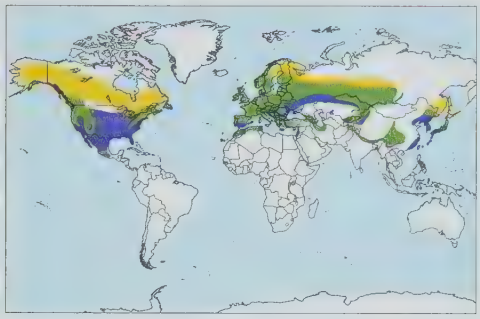
**Food** Kinglets are primarily insectivorous, taking insect eggs, pupae, larvae, and assorted adult insects and other arthropods, and sometimes pollen as well. When insects are scarce, kinglets will eat fruits and seeds.

**Breeding** All species of kinglets are monogamous with biparental care. Kinglets build deep cup-shaped nests that are nearly globular, with only a small, narrow opening at the top. Nests are suspended from a branch, and most incorporate moss and lichen bound by spiderwebs on the outside; they are lined with hair, fur, and feathers of other species, often with feathers totally concealing the nest contents from above. Kinglets lay 4 to 13 eggs, with clutch size generally increasing with latitude. In most regulids, only the female builds the nest; however, in some the male helps a great deal. Only the female incubates the eggs in all species, and in some, the male provisions her while she does so. Incubation takes about 15 days, and both parents feed the chicks. The chicks leave the nest about 17 to 22 days after they hatch, and the fledglings are fed, usually by the male, for up to three weeks after fledging.



Ruby-crowned Kinglet, *Regulus calendula*. Saskatoon, Saskatchewan, Canada. © Nick Saunders.





**Conservation** No regulid species faces immediate conservation concerns.

**Relationships** The kinglets here are placed in their own superfamily, Reguloidea (Alström *et al.* 2014). The position of Regulidae has long baffled taxonomists; occasionally kinglets were placed in Sylviidae *sensu lato*, and more recently as a family within Sylvioidea. Recent molecular studies, however, have found that the kinglets represent an ancient lineage within Passerida with no clear affinities to any one group (Barker *et al.* 2004, Johansson *et al.* 2008b, Alström *et al.* 2014). Two recent large-scale studies do not resolve this relationship; one suggests that Regulidae is an old lineage related equally distantly to the superfamilies Sylvioidea, Muscicapoidea, Certhioidea, and Bombycilloidea (Alström *et al.* 2014), and the other suggests a possible sister relationship with Bombycilloidea (Barker 2014) with these two groups sister to the passeroid radiation. Until the relationships are further clarified, it seems prudent to keep the kinglets in their own superfamily.



Golden-crowned Kinglet, *Regulus satrapa*. Great Herring Pond, Plymouth, Massachusetts, USA. © Ian Davies.

The kinglets are tiny, energetic songbirds of northern temperate treetops. They glean insects from bark crevices, twigs, and leaf clusters, often hovering into overhanging vegetation to snatch a prey item they have spotted from below. They often forage in flocks of their own or other species, giving high sibilant calls that are hard to localize. In the hand, these birds are very delicate, with long, slender legs and toes, and a most distinctive single feather on either side of the bill that covers the naris. Like a less extreme example of the New Zealand wrens, kinglets are off on their own, clearly not corvoids, but not clearly close to any of the other passerines in the huge oscine group.

*REGULUS*
6 species



*R. ignicapilla*
Common Firecrest

# Order: Passeriformes, Bombycilloid Oscines

## Families: Dulidae, Hypocoliidae, Hylocitreidae, Bombycillidae, Ptilogonatidae, Elachuridae

This group, which includes Palmchat, Hypocolius, Olive-flanked Whistler, waxwings, silky flycatchers, and Elachura, is another well-supported clade of songbirds whose affinities have always been difficult to determine. Although the group has long been placed within the large sylvioid radiation (e.g., Fleischer *et al.* 2008), other analyses have placed these birds outside that group (Johansson et al. 2008b, Spellman *et al.* 2008). A recent broad-scale study (Spellman *et al.* 2008) has helped to clarify this position, finding that the families included here form a well-supported clade that appears to be sister to Muscicapoidea and Certhioidea (Alström *et al.* 2014). Alternatively, the bombycilloids may be closely related to the kinglets, which are in turn sister to the large radiation of passeroid oscines (Barker 2014). Again, consensus is elusive.

The work done by Fleischer *et al.* (2008) showing that the recently extinct O'os of Hawaii should have been in their own family (Mohoidae), and that it would have been bombycilloid, added further geographic spread to an already widely scattered group; small bombycilloid families occur in disjunct ranges around the world, including the New World tropics, the Middle East, the Holarctic, and Southeast Asia.



Bohemian Waxwing, *Bombycilla garrulus*. Białowieza, Poland. © Mark A. Chappell.



Black-and-yellow Silky-flycatcher, *Phainoptila melanoxantha*. Paraíso Quetzal, Cerro de la Muerte, Costa Rica. © Alex Vargas.

Passeriformes, Bombycilloid Oscines

# DULIDAE
## Palmchat

1 genus • 1 species

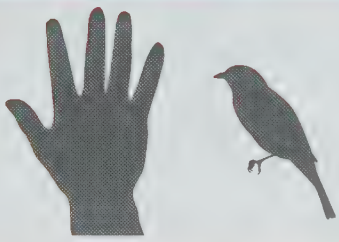
**Related Families** Hypocoliidae (Hypocolius), Hylocitreidae (Olive-flanked Whistler), Ptiliogonatidae (silky flycatchers), Bombycillidae (waxwings)

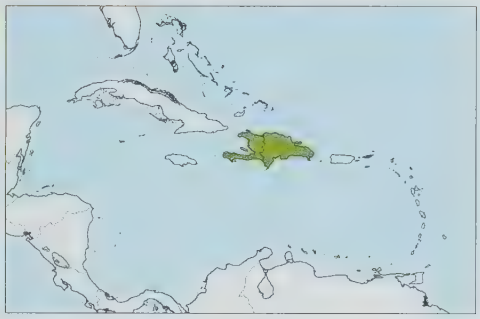
**Similar Birds** Old World orioles (Oriolidae), saltators (Thraupidae), starlings (Sturnidae)

**Description**
- Plumage olive-brown on back, light below with heavy brown streaks
- Wings medium; tail medium-long
- Body size medium, cylindrical ovoid, with upright posture
- Bill medium length, broad at base and deep
- Head medium-sized; neck medium length and thickness
- Legs and feet short, stout
- Sexes similar



Palmchat, *Dulus dominicus*. Santo Domingo National Botanical Gardens, Dominican Republic. © Dubi Shapiro.





**Habitat** Palmchats live in a wide variety of habitats on Hispaniola, including open forest, savanna, farmland, and even urban environments. Their preferred nesting habitat contains royal palm trees (*Roystonea*).

**Food** Palmchats are almost entirely frugivorous, but they appear to supplement their diets with insects and other arthropods as well as leaves and flowers, particularly of royal palms. They typically forage in large groups, high in trees.

**Breeding** Although they build large, communal nests, Palmchats appear to be monogamous, with each pair constructing its own nest chamber. These communal nests are constructed of sticks and placed at the tops of trees, most frequently in royal palms. Typically they house an average of four to ten pairs, although larger and smaller nests have been observed. A tunnel leads to each individual nest chamber, which is lined with grass and leaves. Females typically lay 2 to 7 eggs. All members of the social group participate in building the nest and maintaining it throughout the year. Incubation takes about 15 days. Both males and females provision the young, which leave the nest after about 32 days post-hatch.

**Conservation** The Palmchat does not currently experience any conservation threats.

**Relationships** Dulidae is part of the superfamily Bombycilloidea of oscine passerines (Cibois & Cracraft 2004, Fleischer *et al.* 2008, Alström *et al.* 2014). Although *Dulus* superficially resembles species in the family Oriolidae, it has long been recognized as being closely related to Bombycillidae and Ptiliogonatidae. The molecular phylogenetic study with the best taxon-sampling (Spellman *et al.* 2008) suggests that Dulidae is likely sister to the other members of the Bombycilloidea without Elachuridae (Alström *et al.* 2014), though a four-family tree including Bombycillidae, Dulidae, Ptiliogonatidae, and the recently extinct Mohoidae (Fleischer *et al.* 2008) suggested that Dulidae was sister to Mohoidae and Ptiliogonatidae.



Palmchat, *Dulus dominicus*. Punta Cana, Dominican Republic. © John McKean.

The Palmchat *Dulus dominicus* is endemic to the island of Hispaniola, where it is especially common in a variety of lowland habitats. These same habitats are heavily settled by people, so it is perhaps unsurprising that this highly social bird gets along with people quite well; it nests at the bases of palm crowns, well above the hustle and bustle of humans below. Its communal nests, built of sticks, contain the separate nests of up to 30 different females, all nesting together. Intriguingly, despite this bird's abundance and accessibility, the behavioral and genetic complexities of these and many other aspects of its biology still remain to be discovered.

*DULUS*
1 species



*D. dominicus*
Palmchat

# HYPOCOLIIDAE
## Hypocolius

1 genus • 1 species

**Related Families** Bombycillidae (waxwings), Ptiliogonatidae (silky flycatchers), Dulidae (Palmchat)

**Similar Birds** Waxwings (Bombycillidae), bulbuls (Pycnonotidae)

**Description**
- Plumage gray-brown, with black-and-white wingtip pattern, black sub-terminal band on tail
- Wings medium-short, rounded; tail long, rounded
- Body medium-sized, cylindrical ovoid, with upright posture
- Bill medium-short, straight, slightly inflated
- Head medium-large; neck thick and medium-long
- Legs short; feet small
- Males with distinct black mask

**Habitat** The Hypocolius lives in riparian areas in deserts, arid scrubland, fruit orchards, and other mostly lowland habitats in the Middle East.

**Food** This species feeds primarily on fruits, preferring the berries of *Salvadora persica*, then dates, mulberries, and a host of others. It is not clear to what extent they supplement their diet with insects and other invertebrates during the breeding season when feeding chicks.

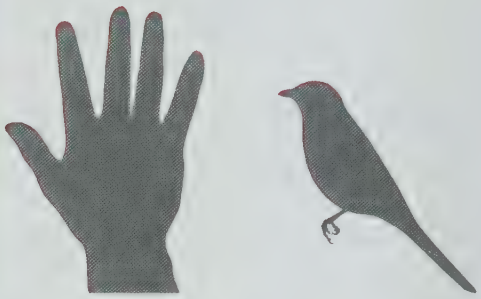
**Breeding** The Hypocolius is monogamous with biparental care. It breeds in small, loose colonies, reaching up to 40 pairs, where an individual pair will defend its own small nest territory. The nest of the Hypocolius is a cup built of grass and other vegetation, usually placed in a tree or thorny bush. Females lay 3 to 5 eggs. Both sexes actively participate in nest construction, incubation, and the feeding of the young. Incubation takes 14 days and the nestlings leave the nest after 13 to 14 days of being fed there.

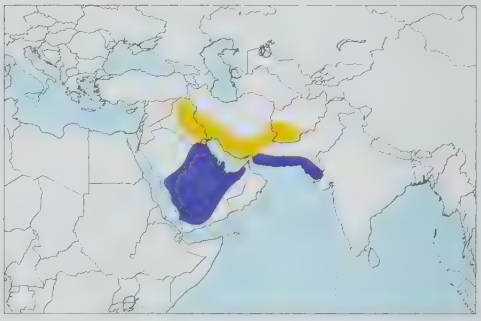
**Conservation** The Hypocolius does not currently experience any conservation threats.

**Relationships** Hypocoliidae is part of Bombycilloidea. *Hypocolius* has long been presumed to be closely related to Bombycillidae, and has at times been included within that family, but the only molecular study to include the species, while confirming its placement in Bombycilloidea, placed it outside a clade that includes Bombycillidae and Ptiliogonatidae and neither more nor less closely related to the other three clades in this group (Spellman *et al.* 2008).



Hypocolius, *Hypocolius ampelinus*.
Ghantoot, United Arab Emirates. © Hanne & Jens Eriksen /VIREO.





The Hypocolius is a lanky, long-tailed bird of the Middle East, with black mask, sleek gray plumage, and striking black wings edged in white. A frugivore year-round, it favors the fruits of the toothbrush tree *Salvadora persica* and date palms, supplementing its diet with insects whenever fruit cannot be found. It breeds in loose colonies of up to 40 pairs, with both sexes incubating and feeding the chicks in a cup nest. Quiet and shy, these birds will often hide in dense vegetation until any perceived danger has passed. Because it lives in a part of the world undergoing political upheaval, it has been hard for outsiders to discover more about this fascinating bird.



Hypocolius, *Hypocolius ampelinus*.
Kutch, Gujarat, India. © Jugal Kishor Tiwari / VIREO.



Hypocolius, *Hypocolius ampelinus*.
Dhofar, Oman. © George L. Armistead /VIREO.

*HYPOCOLIUS*
1 species



*H. ampelinus*
Hypocolius

Passeriformes, Bombycilloid Oscines

# HYLOCITREIDAE
## Olive-flanked Whistler

1 genus • 1 species

**Related Families** Hypocoliidae (Hypocolius), Bombycillidae (waxwings), Ptiliogonatidae (silky flycatchers), Dulidae (Palmchat)

**Similar Birds** Whistlers (Pachycephalidae), bulbuls (Pycnonotidae)

**Description**
- Plumage dull gray with olive-brown back and wings and yellow-olive flanks and undertail coverts
- Wings rounded; tail medium-long, square
- Body medium-sized, cylindrical ovoid, with upright posture
- Bill straight, medium-thin but broad at base, slightly hooked
- Head medium-sized; neck short, thick
- Legs short; feet small
- Males slightly brighter than females

**Habitat** The Olive-flanked Whistler *Hylocitrea bonensis* lives in montane forest between 1200 and 3500 m, and mainly above 2000 m.

**Food** *Hylocitrea* feeds on berries and insects, but no details are known.

**Breeding** Nothing is known of the breeding biology of the Olive-flanked Whistler.

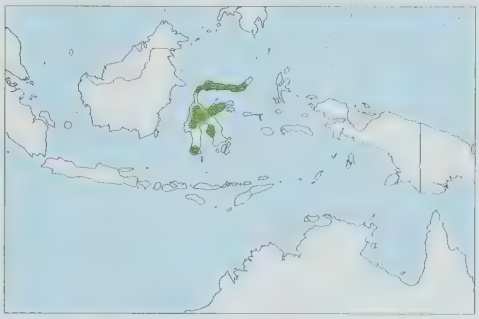
**Conservation** The Olive-flanked Whistler lives in relatively remote montane forests of Sulawesi and is not facing any current conservation concern.

**Relationships** As its common name suggests, this species previously had been placed in Pachycephalidae, but it had also been placed at times with Corvidae and Muscicapidae (Spellman *et al.* 2008). Recent molecular phylogenetic studies have found Hylocitreidae to belong in the Passerida radiation, rather than with the corvoids (Jønsson *et al.* 2008b). Within Passerida, *Hylocitrea* has been found to be part of Bombycilloidea (Spellman *et al.* 2008, Alström *et al.* 2014). Within this clade, it appears Hylocitreidae may be sister to Hypocoliidae. Outside this weakly supported relationship, *Hylocitrea*, perhaps with *Hypocolius*, appears to be sister to a clade made up of Bombycillidae and Ptiliogonatidae (Spellman *et al.* 2008). The official description of this family by Fjeldså and colleagues, with further support for a sister relationship with *Hypocolius*, appears in this volume on page 33.



Olive-flanked Whistler, *Hylocitrea bonensis*.
Lore Lindu NP, Sulawesi. © Rob Hutchinson / Birdtour Asia.



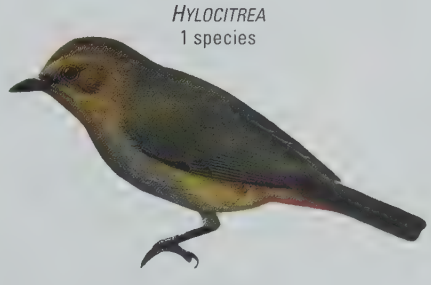


New molecular data have revealed that this somewhat nondescript "whistler" of Sulawesi is actually closer to the waxwings. Perhaps its true affinities should have been suspected earlier, for its song is a series of high-pitched buzzy notes, not the rich whistles of its namesake, and its relatively delicate bill with a terminal hook contrasts with the stouter bills of whistlers as well. In any event, learning more about this montane-forest dweller is a high priority, as not even its nest has yet been described.



Olive-flanked Whistler, *Hylocitrea bonensis*. Lore Lindu NP, Sulawesi. © John McKean.

*HYLOCITREA*
1 species



*H. bonensis*
Olive-flanked Whistler

Passeriformes, Bombycilloid Oscines

# BOMBYCILLIDAE
## Waxwings

1 genus • 3 species

**Related Families** Ptiliogonatidae (silky flycatchers), Hypocoliidae (Hypocolius), Dulidae (Palm-chat), Hylocitreidae (Olive-flanked Whistler)

**Similar Birds** Silky flycatchers (Ptiliogonatidae), bullfinches and crossbills (Fringillidae), starlings (Sturnidae)

**Description**
- Plumage generally tan-brown, with distinct black mask, distinctive red, wax-like tips to secondaries, and yellow- or red-tipped tail
- Wings medium-long, pointed; tail medium-short, rounded
- Body small to medium, cylindrical ovoid, with upright posture
- Bill short, broad thin, straight
- Head small to medium, with short, pointed crest; neck medium-short, thick
- Legs short; feet small
- Sexes similar

**Habitat** Waxwings typically live on the edges of forests where fruiting trees and shrubs are common. However, they may be abundant anywhere in their range where fruiting plants abound, including parks and gardens.

**Food** Bombycillids feed primarily on sugary, low-nutrient, fruits, even during the summer months. Favorites of waxwings include fruits of plants in the rose family (including raspberries, blackberries, cherries, apples, and hawthorns) and juniper berries. When fruits are low in supply, they will eat buds, seeds, and flowers, especially the petals. During the breeding season, waxwings also feed on insects, and are often seen flycatching, but at no time do insects make up a majority of their diet. Though the parents feed some insects to the developing young, they also give them a great deal of fruit.

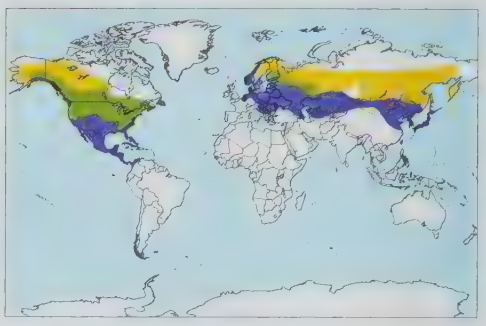
**Breeding** Waxwings are socially monogamous. Because of their reliance on fruit, waxwings nest relatively late in the summer. Bombycillid nests are constructed of grass, twigs, hair, and bark, and they are usually located on the fork of a branch in a tree or large shrub. Both parents participate in nest construction. Females lay 2 to 6 eggs, with 5 eggs being by far the most common clutch size. Only the female incubates the eggs, while the male delivers food to her, and incubation lasts 12 to 14 days. Both parents provision the young, and the chicks fledge after 14 to 18 days in the nest. Chicks are fed mostly fruit after the first couple of days of nestling life. The fledglings are fed for up to 10 days after they leave the nest, but they soon join a group of other fledglings, with whom they associate into the following winter.



Cedar Waxwing, *Bombycilla cedrorum*. Bellbrook, Ohio, USA. © John McKean.

**Conservation** Habitat loss is the primary threat facing bombycillids, a single species of which (33%) is of conservation concern (1 NT). The Japanese Waxwing *Bombycilla japonica* is the most range-restricted of the three waxwing species and has a naturally small population. Habitat destruction and control measures by commercial fruit-growers appear to be the greatest threats to this species' population.





**Relationships** Bombycillidae is part of the relatively recently recognized superfamily Bombycilloidea (Cibois & Cracraft 2004, Reddy & Cracraft 2007, Alström *et al.* 2014). Within this radiation, Bombycillidae appears most likely to be sister to Ptiliogonatidae, but it may also be sister to the rest of the bombycilloids outside of Elachuridae (Spellman *et al.* 2008, Fleischer *et al.* 2008).

Waxwings are perhaps best known during the non-breeding season, when nomadic flocks, sometimes containing thousands of birds, brighten winter days as they descend upon fruiting trees across the Northern Hemisphere, and sometimes get drunk on fruit that has fermented. More reliant on fruit than any other Northern Hemisphere birds, waxwings are the only birds outside the tropics to feed fruit to their young. Close up, one can see tiny drops of intense color on the trailing edge of their wings; these are the bits of keratin, fused in a waxy texture, that give this group its name. During the breeding season, waxwings are far less conspicuous, often breeding in a loose aggregation of pairs along streams or forest openings.



Bohemian Waxwing, *Bombycilla garrulus*. Pike Lake Provincial Park, Saskatchewan, Canada. © Nick Saunders.

*BOMBYCILLA*
3 species



*B. japonica*
Japanese Waxwing

Passeriformes, Bombycilloid Oscines

# PTILIOGONATIDAE
## Silky Flycatchers

3 genera • 4 species

**Related Families** Bombycillidae (waxwings)

**Similar Birds** Waxwings (Bombycillidae), monarch flycatchers (Monarchidae)

**Description**
- Plumage gray, brown, or glossy black, often with yellow or white contrasts
- Wings rounded; tail long, usually graduated
- Body medium-sized, cylindrical ovoid, with upright posture
- Bill short, straight, dorso-ventrally flattened; most species with rictal bristles
- Head medium-sized, with distinct crest in most species; neck short, thick
- Legs short; feet small
- Males generally more colorful and boldly patterned than females

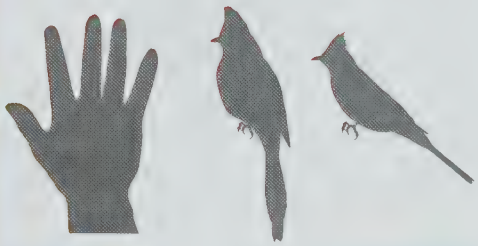
**Habitat** Most silky flycatcher species live in montane woodlands, but the Phainopepla *Phainopepla nitens* lives in desert, arid scrub, and riparian habitats.

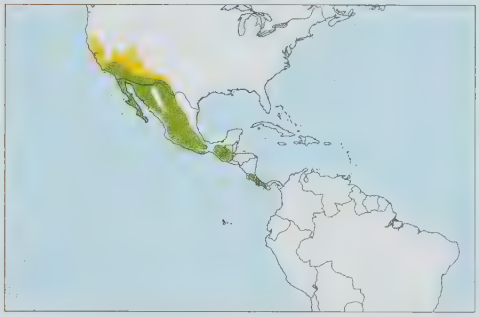
**Food** Silky flycatchers feed primarily on fruits and insects. Some species, like the Black-and-yellow Silky Flycatcher *Phainoptila melanoxantha*, feed almost exclusively on fruit. Others, like the Phainopepla, feed on fruits only during colder months when insects are less abundant. Flying insects, caught on the wing with a sally from a perch, constitute the majority of the insect diet of silky flycatchers. A specialist on mistletoe berries in the non-breeding season, the Phainopepla possesses a digestive tract that is highly modified to process large quantities of this low-nutrient, viscous food.

**Breeding** Ptiliogonatids are monogamous with biparental care. The Phainopepla is unusual in that breeding occurs twice a year in two different sites, with the earlier breeding attempt occurring in the early spring in the inland desert, and the later one in the summer in woodlands nearer the coast. It is not known whether the same individuals breed in both habitats, but the presence of two distinct breeding periods in two distinct habitats is notable and fascinating. The nests of silky flycatchers are usually bulky cups constructed from twigs and plant fibers. The



Phainopepla, *Phainopepla nitens*.
Joshua Tree NP, California, USA. © Mark A. Chappell.





The silky flycatchers are a small group of sleek, elegant birds found only in Central America and the southwestern United States. Despite their name, most eat more fruit than insects, concentrating on insect foraging primarily when they are feeding young chicks. Their plumages are indeed silky, and these birds have some of the most understated elegance in texture, shade, and form of any birds. Their classy looks are not matched by their vocalizations; some of them mimic other species, but none engage in long or complicated songs. At least one species appears to move hundreds of kilometers between breeding attempts, indicating an awareness of environmental conditions across an unusually broad spatial scale.



Gray Silky-flycatcher, *Ptiliogonys cinereus*. Teotitlán del Valle, Oaxaca, Mexico. © Ian Davies.

nests of the tropical species are often covered in lichens and mosses. Clutch size for the ptiliogonatids is generally 2 eggs, with Phainopeplas laying up to 4. Parental roles are known only for two species. In the Phainopepla, both sexes help nearly equally with incubation, which takes about 14 days, and in the Long-tailed Silky Flycatcher *Ptilogonys caudatus*, the female alone incubates the eggs, for a period of 16 to 17 days. Both parents feed the young in these two species, and young Phainopeplas are in the nest for about 20 days, whereas nestlings of *P. caudatus* stay in the nest for 24 to 25 days before fledging.

Conservation None of the ptiliogonatids currently are at risk.

Relationships Ptiliogonatidae is part of the bombycilloid radiation of oscine passerines (Cibois & Cracraft 2004, Voelker & Spellman 2004, Reddy & Cracraft 2007, Alström *et al.* 2014). Within this radiation, Ptiliogonatidae is likely sister to Bombycillidae (Fleischer *et al.* 2008, Spellman *et al.* 2008), though this relationship may have been eclipsed by a closer relationship with the recently extinct Mohoidae of Hawaii (Fleischer *et al.* 2008).



Long-tailed Silky-flycatcher, *Ptiliogonys caudatus*. Calle San Gerardo, San Gerardo de Dota, Costa Rica. © John McKean.



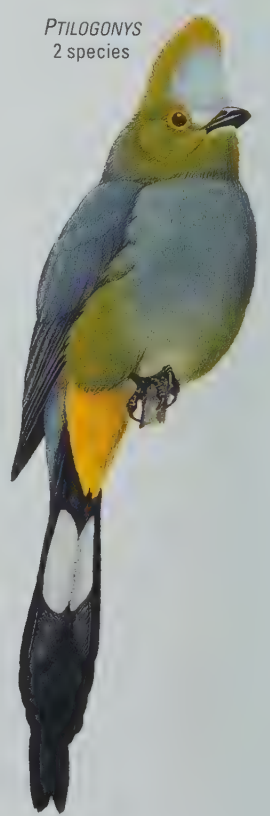
*PHAINOPTILA*
1 species

*P. melanoxantha*
Black-and-yellow Silky-flycatcher



*PHAINOPEPLA*
1 species

*P. nitens*
Phainopepla



*PTILOGONYS*
2 species

*P. caudatus*
Long-tailed Silky-flycatcher

Passeriformes, Bombycilloid Oscines

# ELACHURIDAE
Elachura

1 genus • 1 species

**Related Families** Bombycillidae (waxwings), Dulidae (Palmchat), Ptiliogonatidae (silky flycatchers), Hylocitreidae (Olive-flanked Whistler), Hypocoliidae (Hypocolius)

**Similar Birds** Wren-babblers (Timaliidae and Pellorneidae), cupwings (Pnoepygidae), wrens (Troglodytidae)

**Description**
- Plumage dark brown overall, with reddish-brown wings, dark barring on tail, and white flecking over entire body
- Wings extremely short, rounded; tail short
- Body small, ovoid, compact
- Bill medium length, thin, straight
- Head large; neck short, thick
- Legs long; feet very long
- Sexes similar

**Habitat** Elachuras live in broadleaf evergreen temperate and semi-tropical forests, showing a preference for dense underbrush, including ferns and rhododendron. They are usually found along densely vegetated, steep-sided gullies.

**Food** *Elachura* feeds on insects. No other information is available regarding foraging or specific dietary preferences.

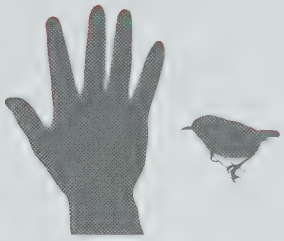
**Breeding** This monotypic family is poorly known and virtually unstudied. The single nest described for this species was a deep, partially domed cup built of grass, leaves, twigs, and other material, lined with feathers. This nest was found on the ground, concealed by vegetation, and it contained 3 or 4 eggs. No other information on its breeding biology is known.

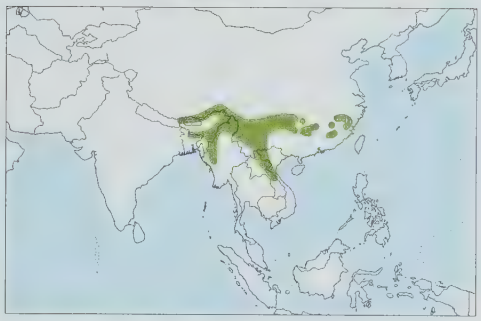
**Conservation** The Elachura does not currently pose any specific conservation concern.



Elachura, *Elachura formosa*.
Emeifeng, Fujian Province, China. © Christian Artuso.

**Relationships** Elachuridae is treated here as part of the bombycilloid radiation of oscine passerines. Previously it had been placed with timaliid wren-babblers in the genus *Spelaeornis*, but recent research has found that, like the newly split Pnoepygidae (Gelang *et al.* 2009, Alström *et al.* 2011, Fregin *et al.* 2012, Alström *et al.* 2013a), *Elachura* is very far from the other wren-babblers, not even belonging in Sylvioidea. Although the relationships are not very strongly supported, Elachuridae appears to be sister to the rest of Bombycilloidea (Alström *et al.* 2014).





Long overlooked among the plethora of brown, streaked babblers that occupy the thickets of Asia, this denizen of moist mountain undergrowth has recently been uncovered from obscurity by molecular work showing not only that it is not a babbler, but also that its closest affinities are outside the entire sylvioid radiation. Thus, rather than calling it the Spotted Wren-babbler, it seems better to know it by its generic—and apt—name, Greek for "short tail." The phylogenetic branch connecting Elachura to others is long, and clearly ancient. Not surprisingly, not much is known of its biology, and future field work should help us determine if the one nest tentatively ascribed to this species is typical.



Elachura, *Elachura formosa*. Emeifeng, Fujian Province, China. © Christian Artuso.

*ELACHURA*
1 species



*E. formosa*
Elachura

# Order: Passeriformes, Passeroid Oscines

Families: Promeropidae, Modulatricidae, Irenidae, Chloropseidae, Dicaeidae, Nectariniidae, Prunellidae, Peucedramidae, Urocynchramidae, Ploceidae, Estrildidae, Viduidae, Passeridae, Motacillidae, Fringillidae, Calcariidae, Rhodinocichlidae, Emberizidae, Passerellidae, Zeledoniidae, Teretistridae, Icteridae, Parulidae, Phaenicophilidae, Spindalidae, Nesospingidae, Calyptophilidae, Mitrospingidae, Cardinalidae, Thraupidae

Passeroidea (Parvorder Passerida *sensu* Cracraft 2014) is the third very large and diverse superfamily of oscines. It consists of two main groups with different centers of diversity. The first is a large collection of families found primarily in the Old World, comprising sugarbirds and spot-throats from Africa; fairy-bluebirds, leafbirds, flowerpeckers, and sunbirds from southern Asia; accentors from Eurasia; a lone New World species, the Olive Warbler, from Central America; and Pink-tailed Bunting from central China. The Old World families continue with weavers and waxbills in Africa and Asia; viduines in Africa, together sometimes treated as a distinct superfamily, Ploceoidea (Cracraft 2014); then Old World sparrows from Eurasia; and pipits and wagtails mostly in Eurasia and Africa (Ericson & Johansson 2003). The very diverse fringillid finches are Holarctic with an extension by the fringillid genera *Euphonia* and *Chlorophonia* into the Neotropics. These largely Old World families do not form a monophyletic clade and are instead successively sister to groups farther up the tree (Ericson *et al.* 2003b, Ericson & Johansson 2003).

In contrast, the second group, a largely New World radiation often collectively called the New World "nine-primaried oscines," and sometimes separated into the superfamily Emberizoidea (Cracraft 2014), forms a massive monophyletic clade that includes a spectacular diversity of songbirds (Barker *et al.* 2013). The Holarctic longspurs (Calcariidae) are the first of this large group. Next in the list, the single species of Thrush-tanager is Neotropical, but it is followed by the Old World buntings of Eurasia. The tree continues with the New World sparrows (DaCosta *et al.* 2009, Klicka *et al.* 2014), progresses through the Neotropical Wren-thrush and Cuban warblers, and through the large and widespread families of New World blackbirds and warblers (Lovette *et al.* 2010), where it reaches a series of five small families of tanager-like endemics before getting to the sister families of cardinals and tanagers, the latter of which, despite having several families carved out of it, still contains over 350 species. Rather than try to describe relationships in these groups and the rest of this large group, we present a slightly adapted tree from Barker *et al.* (2013) in Figure 5 (p. 19).



Rose-bellied Bunting, *Passerina rositae*.
Arriaga, Chiapas, Mexico. © Luke Seitz.



Olive-backed Sunbird, *Cinnyris jugularis*.
Singapore Botanic Gardens, Singapore. © Con Foley.

Passeriformes, Passeroid Oscines

# PROMEROPIDAE
## Sugarbirds

1 genus • 2 species

**Related Families** Modulatricidae (Spot-throat and allies), all other 28 passeroid families

**Similar Birds** Honeyeaters (Meliphagidae), sunbirds (Nectariniidae), starlings (Sturnidae)

**Description**
- Plumage dull-brown with brown streaks on breast and yellow vent and rump
- Wings medium-long, pointed; tail extremely long
- Body medium-small, cylindrical ovoid
- Bill long, thin, slightly decurved
- Head medium-sized; neck medium-thick and medium-long
- Legs short; feet small
- Males larger with longer, more exaggerated tails than females

**Habitat** The sugarbirds are confined to protea and fynbos scrub habitat in the uplands of southern Africa, where they are dependent on the flowers of *Protea* and other native plants for nectar.

**Food** Sugarbirds feed primarily on nectar, but also eat insects, including beetles, small flies, ants, and wasps. Most insects are taken from the inflorescences the sugarbirds are visiting for nectar, and occasionally they are caught in short flycatching sallies. As with many other nectarivorous birds, sugarbirds are important pollinators of *Protea* and other flowers that they visit, and they also support large numbers of specialized floral mites in their nostrils, which they spread from flower to flower.

**Breeding** Promeropids are monogamous with biparental care. Males are extremely territorial and aggressive toward other males, especially during the early part of the breeding season. Sugarbirds typically build their open cup-shaped nests in a dense *Protea* bush to protect them from inclement weather. Nests are constructed from twigs and grass and are lined with *Protea* seed down. Female sugarbirds typically lay 2 eggs. The females are primarily responsible for nest construction, and they alone incubate. The chicks hatch after an incubation period of 16 to 17 days, and both male and female feed the young a diet of small insects. The young leave the nest after 17 to 23 days, and they are fed by their parents for a further three or four weeks after fledging.



Cape Sugarbird, *Promerops cafer*.
Cape Town, South Africa. © Dubi Shapiro.

**Conservation** Neither promeropid species faces immediate conservation concerns.

**Relationships** The sugarbirds are part of the superfamily Passeroidea of oscine passerines. Morphological and behavioral traits indicated that the sugarbirds were closely related to Meliphagidae, Nectariniidae, or Sturnidae. However, although molecular phylogenetic studies have not fully established their affinities, current evidence suggests that they instead represent an early lineage within the large and diverse superfamily Passeroidea (Barker *et al.* 2004, Beresford *et al.* 2005, Johansson *et al.* 2008b, Fjeldså *et al.* 2010). The most inclusive phylogenetic studies suggest that Promeropidae is either sister to another African endemic family, Modulatricidae (Barker *et al.* 2004, Beresford *et al.* 2005), or sister to the entire Passeroidea radiation including modulatricids (Johansson *et al.* 2008b, Fjeldså *et al.* 2010).



Cape Sugarbird, *Promerops cafer*. Kirstenbosch National Botanical Garden, Cape Town, South Africa. © Ken Behrens.



These slightly shaggy brown and whitish birds may be unremarkable in coloration, but they make up for it with their impressively long streamer-like tails. Their bill, too, is long and thin, and slightly decurved, ideally suited for a diet of nectar and insects. Sugarbirds are especially fond of nectar from the flowers of *Protea*, a genus with origins in the Gondwanan flora known, appropriately, as sugarbushes. They build their cup nests in these shrubs, lining them with the fluff from *Protea* seeds. Males are aggressive in defending a territory and a mate, and they court females with spectacular aerial displays in which they jerk their long tails up and down while using specially adapted wing feathers to produce clacking noises.

*PROMEROPS*
2 species



*P. gurneyi*
Gurney's Sugarbird

# MODULATRICIDAE
## Spot-throat and Allies

3 genera • 3 species

Related Families Promeropidae (sugarbirds), all other 27 passeroid families

Similar Birds Babblers (Timaliidae, Pellorneidae, Leiothrichidae), thrushes (Turdidae and Muscicapidae)

Description
- Plumage predominantly brown or olive, pale on breast in *Kakamega*, some degree of spotting or streaking on throat and breast in other two species
- Wings short, rounded; tail medium-long
- Body small, cylindrical ovoid
- Bill straight, short to medium in length
- Head small to medium; neck short, thick
- Legs medium-long; feet large
- Sexes similar

Habitat The modulatricids live in areas of tropical montane forest with dense undergrowth.

Food Little is known about the food habits of this family. Based on limited observations and stomach contents from museum specimens, birds are known to feed on invertebrates and berries. They primarily forage on the ground, either probing the ground with their bills or tossing and flicking leaves aside. Both *Kakamega* and *Modulatrix* sometimes follow army ant swarms.

Breeding The breeding biology of this family is very poorly known. Only a few nests have been described, open cups of twigs, leaves, and moss placed on or within 2 m of the ground. Females lay 2 eggs, and nothing else is known.

Conservation Habitat loss is the main threat facing modulatricids, putting at risk one (33%) of the three species (1 VU). The Dapple-throat *Arcanator orostruthus* is restricted to three very widely separated areas of montane forest in



Dapple-chest, *Arcanator orostruthus*. Ndundulu Forest, Udzungwa Mountains, Tanzania. © Louis A. Hansen.





These three brown, thrush-like birds are limited to tiny areas in the montane forests of tropical Africa. It is therefore unsurprising that we know little about them. They forage for insects on the ground in dense undergrowth, and are more often heard than seen, their whistled songs and calls recalling those of Old World orioles. Two of these species have only a single nest description each, and the nest of the third has apparently never been described.



Spot-throat, *Modulatrix stictigula*. West Usambara Mountains, Tanzania. © Jon Hornbuckle / ARKive.

Tanzania and Mozambique that are threatened by logging for agriculture and other uses by an increasing human population in these remote mountains.

Relationships Modulatricidae is part of the large passeroid radiation of oscine passerines. The Dapple-throat, Spot-throat, and Gray-breasted Kakamega have always been "problem" taxa, sometimes having been placed with Timaliidae *sensu lato*, Pycnonotidae, or Turdidae. Recent molecular work has shown that these three species group together in a well-supported clade (Johansson *et al.* 2008b), which is sister either to Promeropidae (Barker *et al.* 2004, Beresford *et al.* 2005) or to the rest of Passeroidea excluding Promeropidae (Johansson *et al.* 2008b, Fjeldså *et al.* 2010). While the group has not always been recognized as a separate family, the name we use here has been used elsewhere (Fjeldså & Bowie 2008), and it is formally described by Fjeldså and colleagues in this volume on page 34.



Gray-chested Kakamega, *Kakamega poliothorax*. Mount Cameroon, Cameroon. © Christian Artuso.

*ARCANATOR*
1 species



*A. orostruthus*
Dapple-chest

*MODULATRIX*
1 species



*M. stictigula*
Spot-throat

*KAKAMEGA*
1 species



*K. poliothorax*
Gray-chested Kakamega

# IRENIDAE
## Fairy-bluebirds

1 genus • 2 species

Related Families Chloropseidae (leafbirds)

Similar Birds Cotingas (Cotingidae), birds-of-paradise (Paradisaeidae), jays (Corvidae)

Description
- Plumage blue with brown or black
- Wings medium-long, pointed; tail medium-long
- Body medium-sized, cylindrical ovoid
- Bill medium-long, inflated, hooked
- Head medium-sized; neck short, thick
- Legs medium-short; feet small
- Males more brightly colored and boldly patterned than females

Habitat Fairy-bluebirds live in lowland and mid-elevation forest and forest edges.

Food Irenids are primarily frugivorous, although they eat smaller amounts of insects and other small invertebrates. Very occasionally, and perhaps only in some regions, nectar may be taken. Their favorite fruits by far are *Ficus* figs, but stomach contents suggest that a considerable diversity of fruits, from very small to very large, are at least sampled. Most fruits are taken in a brief hover-snatch, with small fruits being grabbed as the bird flutters slowly by the fruit cluster.

Breeding Very little information is available on the breeding biology of either species in the wild, and most data come from observations of captive birds. Irenids appear to be monogamous with biparental care. The nests of fairy-bluebirds are simple structures, being little more than shallow cups built mainly of sticks and lined with finer material such as moss and bryophytes. Females lay 1 or 2 eggs, most often 2. In captivity, only the female has been observed to build the nest and incubate the eggs. The extent of male care is not well understood, with males having been recorded as assisting in feeding the young in some cases, and not helping at all in others. Incubation takes about 14 days, and the chicks are fed mostly insects and very little or no fruit. The chicks fledge after 11 to 18 days in the nest (most often 13 days).

Conservation Neither irenid species faces immediate conservation concerns.

Relationships The fairy-bluebirds are part of the passeroid radiation of oscine passerines. Current molecular phylogenetic evidence suggests that they are likely sister to Chloropseidae (Barker *et al.* 2004, Beresford *et al.* 2005, Treplin *et al.* 2008, Fjeldså *et al.* 2010). Outside of Chloropseidae, the position of Irenidae is difficult to determine. The clade made up of irenids plus chloropseids may be sister to the clade made up of Nectariniidae plus Dicaeidae (Johansson *et al.* 2008b) or to the larger part of the passeroid radiation excluding Nectariniidae, Promeropidae, and Modulatricidae (Barker *et al.* 2004, Beresford *et al.* 2005, Treplin *et al.* 2008, Fjeldså *et al.* 2010).



Asian Fairy-bluebird, *Irena puella*.
Kaeng Krachan NP, Thailand. © Francesco Veronesi.





Males of these bulky songbirds bear intense and omni-directional blue plumage, which cascades down the back onto long feathers of the rump and upper tail coverts. Despite this brilliant coloration, these birds can be remarkably hard to see, for they spend most of their lives in search of fruits in the canopies of Asian forests. When breeding, they abandon the treetops to build a very small and shallow flimsy cup nest, sometimes adorned and lined with moss, only a few meters from the forest floor. There is some indication that flocks of fairy-bluebirds may segregate by sex and/or age outside the breeding season, suggesting a great deal of interesting social biology yet to be discovered in this group.



Asian Fairy-bluebird, *Irena puella*. Taman Negara, Malaysia. © Con Foley.

*IRENA*
2 species



*I. cyanogastra*
Philippine Fairy-bluebird

Passeriformes, Passeroid Oscines

# CHLOROPSEIDAE
## Leafbirds

1 genus · 11 species

**Related Families** Irenidae (fairy-bluebirds)

**Similar Birds** Fruiteaters (Cotingidae), green broadbills (Calyptomenidae), bulbuls (Pycnonotidae)

**Description**
- Plumage bright green with contrasts in yellow, orange, or blue, often with black mask or bib
- Wings medium-long; tail medium-short
- Body medium-sized, cylindrical ovoid
- Bill medium-long, straight or very slightly decurved
- Head small to medium; neck short, medium-thick
- Legs and feet short, stout
- Males usually more brightly colored and/or boldly patterned than females

**Habitat** The leafbirds live in rainforests, from the lowlands to mountains.

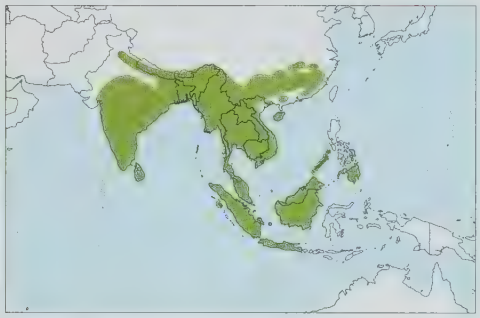
**Food** Leafbirds appear to forage predominantly on insects, which they glean from leaves and branches in the canopy. They do, however, include a large amount of fruit (particularly figs) in the diet at times, and at least some nectar. Although the birds often visit flowers, and have their faces smeared with pollen as a result, it is still not clear how much nectar—as opposed to insects—they consume there. Leafbirds do have a brush-tipped tongue, which would presumably allow them to exploit nectar sources effectively.

**Breeding** Very little is known of the breeding biology of leafbirds. It is unclear whether they are socially monogamous, although there is currently no evidence to suggest otherwise. Leafbird nests are untidy open cups constructed of stems, leaves, rootlets, and other fine plant materials.



Orange-bellied Leafbird, *Chloropsis hardwickii*. Fraser's Hill, Pahang, Malaysia. © Con Foley.

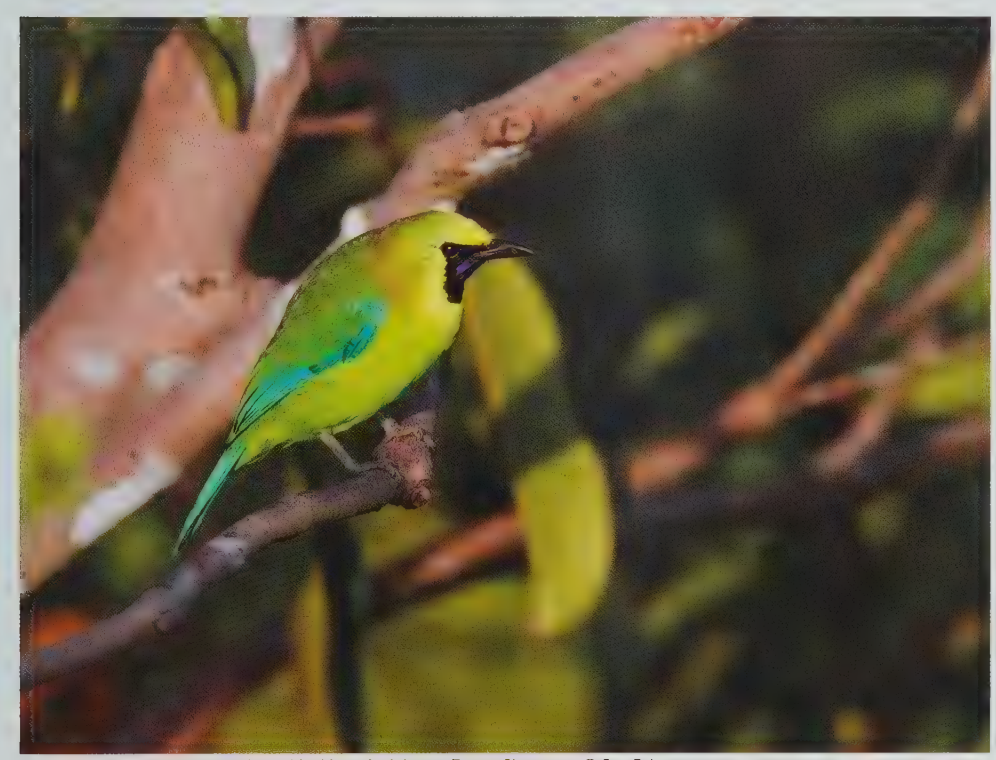




Nests are suspended from between two narrow branches in the canopy of a tree and decorated and anchored with spiderwebs, lichen, and mosses. From the limited data available, it appears that female leafbirds lay 2 or 3 eggs. Only the female appears to incubate the eggs. No data are available on the roles of the sexes in brooding the chicks or provisioning the young. In captivity, incubation takes 13 to 14 days, and it appears that young leave the nest after 12 to 15 days.

**Conservation** Habitat loss is the primary threat facing the three species of chloropseids (27%) that are of conservation concern (2 NT, 1 VU). The vulnerable Philippine Leafbird *Chloropsis flavipennis* and the two near-threatened species (*C. venusta* and *C. cyanopogon*) are at risk from logging and conversion of tropical forest to farmland. Many leafbirds are also taken for the cage-bird trade.

**Relationships** Chloropseidae is part of the passeroid radiation of oscine passerines, within which it is likely sister to Irenidae (Beresford *et al.* 2005, Treplin *et al.* 2008, Fjeldså *et al.* 2010). Irenidae and Chloropseidae taken together may in turn be sister to Nectariniidae plus Dicaeidae (Johansson *et al.* 2008b) or to a large radiation of the superfamily Passeroidea not including Nectariniidae and Promeropidae (Beresford *et al.* 2005, Treplin *et al.* 2008, Fjeldså *et al.* 2010).



Blue-winged Leafbird, *Chloropsis cochinchinensis*. Jelutong Tower, Singapore. © Con Foley.

All of the aptly named leafbirds are the color of newly emerged tree leaves, and their intense spring green makes them maddeningly hard to see, even at short distance. But one is seldom close, as these birds characteristically keep to the canopy in Asian forests. Having brush-tipped tongues, they likely eat some nectar, but most of the time they appear to focus on insects. Although they are quite vocal, their songs are rather disjointed, and, perhaps because some species are pretty good mimics, their calls can be hard to identify. They remain in the canopy when building their open cup nest, and, as a result, many aspects of their breeding biology remain to be discovered.

*CHLOROPSIS*
11 species



*C. venusta*
Blue-masked Leafbird

# DICAEIDAE
## Flowerpeckers

2 genera • 44 species

Related Families Nectariniidae (sunbirds and spiderhunters)

Similar Birds Tanagers (Thraupidae), euphonias and honeycreepers (Fringillidae)

Description
- Plumage of males often glossy blue or black above, lighter and brighter below, often with white, yellow, or red; females (and males in some species) dull olive-green above and lighter below
- Wings short to medium, rounded; tail short
- Body small to medium, ovoid, compact
- Bill short to medium, slightly decurved or straight, broad-based and often deep
- Head large; neck short, thick
- Legs medium; feet small
- Males usually brighter and more boldly patterned than females

Habitat The flowerpeckers live in a wide variety of wooded and open habitats near forest edges, including dry woodlands, deciduous forests, riparian habitats, and tropical forests from sea level to 3700 m.

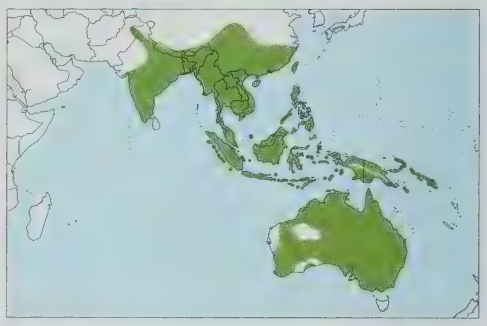
Food Flowerpeckers primarily feed on fruits and nectar, although some are known to eat seeds, and most or all also eat insects and other arthropods. Many flowerpeckers prefer mistletoe berries, the extremely sticky seeds of which present special challenges to frugivores. Some species of mistletoe rely almost exclusively on flowerpeckers to disperse their seeds.

Breeding Little is known about the breeding behavior of most flowerpeckers, although they appear to be monogamous. The nest of flowerpeckers, constructed by only the female in some and by both sexes in others, is a hanging pouch with an entrance on its side. Nests are usually well concealed, and are built of mosses, spiderwebs, and small roots. Female flowerpeckers typically lay 1 to 4 eggs. It is thought that females alone incubate the eggs. From observations of the Mistletoebird *Dicaeum hirundinaceum* in temperate Australia, incubation takes about 10 to 12 days. Both parents provision the chicks, feeding them at least partially a fruit diet, and the young fledge in about 15 days.



Scarlet-backed Flowerpecker, *Dicaeum cruentatum*. Pasir Ris, Singapore. © Con Foley.

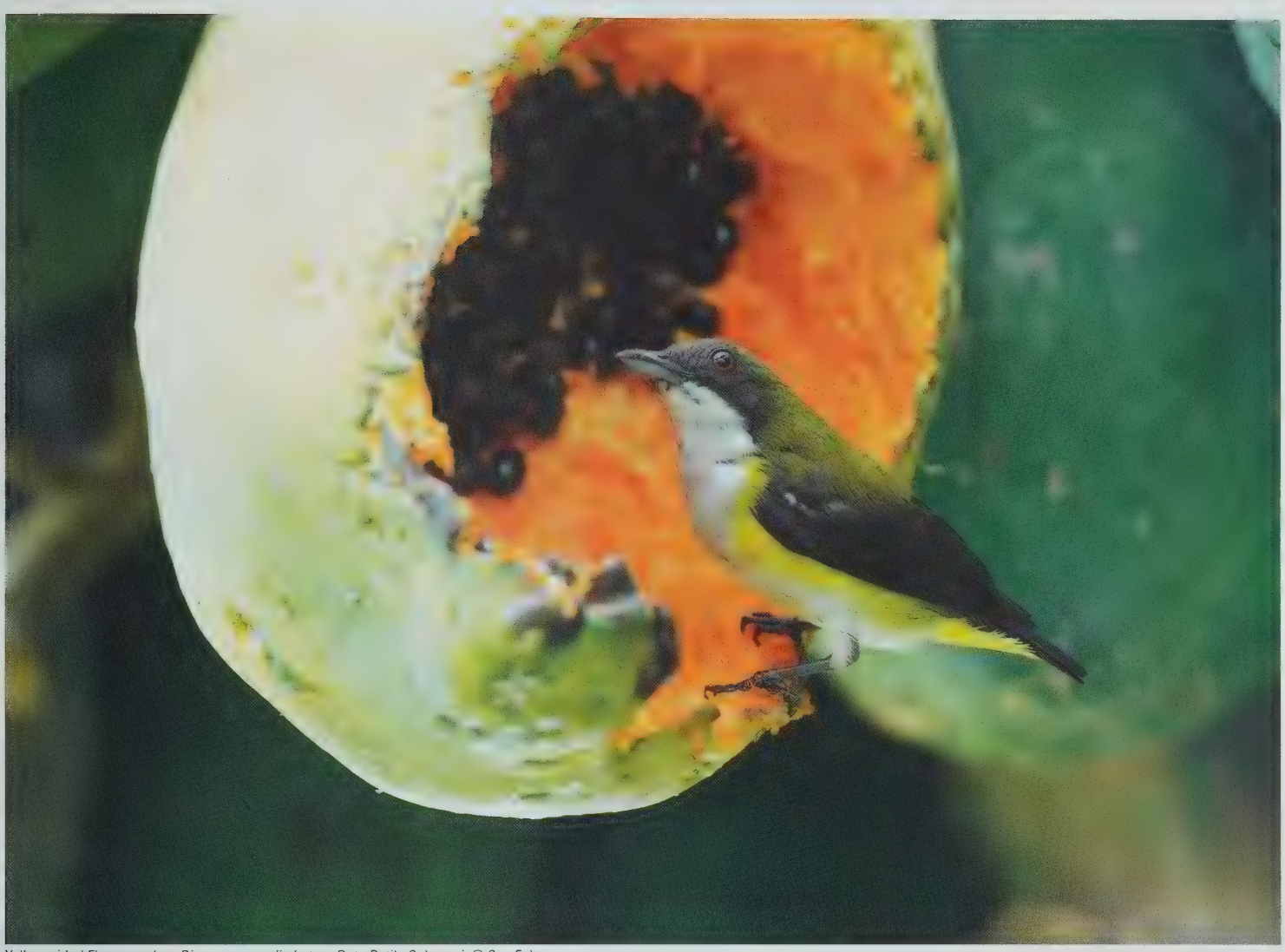




Flowerpeckers are frenetic fruit-cruisers of tropical Asian forest canopies. With a series of emphatic chip notes, shrieks, chatters, and twitters, they herald their presence above, yet they pass just as suddenly as they arrived. In open areas with lower fruiting trees, these brilliantly patterned bundles of feathered energy come nearer the ground, but even at a fruiting bush, they seem never to stay long, leaving observers hoping for a better look next time. As far as we know, they never actually peck flowers, instead eating a diet of fruit (especially mistletoe) and nectar, which they also feed to their young.



Orange-bellied Flowerpecker, *Dicaeum trigonostigma*. Baan Maka, near Kaeng Krachan NP, Thailand. © Alex Vargas.



Yellow-sided Flowerpecker, *Dicaeum aureolimbatum*. Batu Putih, Sulawesi. © Con Foley.

**Conservation** Eight species (18%) of flowerpeckers are threatened by habitat loss (5 NT, 2 VU, 1 CR). The critically endangered Cebu Flowerpecker *Dicaeum quadricolor*, endemic to the Philippine island of Cebu, was thought to be extinct until its rediscovery in 1992. Like several other declining species, it has suffered from extensive clearing of lowland forest. The only hope for this species, which was never widespread, appears to be intensive protection of the tiny fragments of habitat remaining in its range together with reforestation with native species. Other flowerpeckers of conservation concern are mostly range-restricted species, especially those in the Philippines, such as the vulnerable Scarlet-collared Flowerpecker *Dicaeum retrocinctum* and Black-belted Flowerpecker *Dicaeum haematostictum*, each limited to tiny remnants of forest on three different Philippine islands. Others are like the near-threatened Scarlet-breasted Flowerpecker *Prionochilus thoracicus*, which has a relatively broad range in southern Asia, but for unknown reasons has always seemed rare or uncommon in that range.

**Relationships** The flowerpeckers are part of the passeroid radiation of oscine passerines. In the past, the affinities of the flowerpeckers were obscured by the independent evolution of nectar feeding in many groups of passerines; however, most molecular phylogenetic studies now suggest that Dicaeidae is sister to Nectariniidae (Ericson & Johansson 2003, Sefc *et al.* 2003, Beresford *et al.* 2005, Nyári *et al.* 2009b, Fjeldså *et al.* 2010, Moyle *et al.* 2011). Outside this core sister relationship, there is a range of possible polytomies and closer relationships involving Chloropseidae and Irenidae (Johansson *et al.* 2008b) or many of the other passeroids excluding Promeropidae and Modulatricidae (Ericson & Johansson 2003, Beresford *et al.* 2005, Fjeldså *et al.* 2010).

*PRIONOCHILUS*
6 species



*P. percussus*
Crimson-breasted Flowerpecker

*DICAEUM*
38 species



*D. hirundinaceum*
Mistletoebird

# NECTARINIIDAE

## Sunbirds and Spiderhunters

16 genera • 132 species

**Related Families** Dicaeidae (flowerpeckers)

**Similar Birds** Honeycreepers (Thraupidae and Fringillidae), honeyeaters (Meliphagidae), asities (Philepittidae), hummingbirds (Trochilidae)

**Description**

- Plumage of sunbirds bright reds, yellows, iridescent greens and blues in bold patterns; spiderhunters olive-yellow, lighter and often streaked below; both groups have many species with orange pectoral tufts of feathers
- Wings medium length, rounded; tail medium-short in most species, but with very long central rectrices in some male sunbirds
- Body small to medium, cylindrical ovoid, compact
- Bill thin, decurved, pointed, long to extremely long in spiderhunters
- Head medium to large; neck medium
- Legs medium to short; feet small
- Male sunbirds generally more brightly colored and boldly patterned than females, often with ornamentation in tail

**Habitat** Nectariniid habitat varies widely from dry acacia savanna to tropical rainforest and from sea level to 4900 m. Many species, especially those in drier regions, wander extensively in search of flowers.

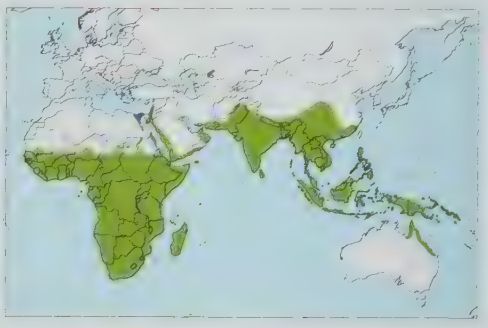
**Food** Most sunbirds and spiderhunters are primarily insectivorous, but most also rely heavily on nectar, using their long, pointed bills to reach deep into flowers. The tongues of sunbirds and spiderhunters are brush-tipped and have a tubular shape much like those of hummingbirds. Some species also feed on fruit and berries.

**Breeding** Sunbirds are predominantly monoga-



Orange-breasted Sunbird, *Anthobaphes violacea*. Cape Town, South Africa. © Dubi Shapiro.





Sunbirds do much to make up for the lack of hummingbirds in the Old World. With their brilliant iridescence and saturated colors, these lightly proportioned songbirds with thin, decurved bills do sometimes hover in front of nectar-bearing flowers, though never with the maneuverability and stability of hummingbirds. Many species defend nectar resources against others, but most are monogamous and territorial in the breeding season. Spiderhunters on the other hand are much less likely to be territorial and are often trap-liners, flying swiftly in direct lines from one nectar source to another through the dense Asian undergrowth. Spiderhunters do eat a lot of spiders and insects, but so do sunbirds, and the two groups actually differ very little in overall diet.



Streaked Spiderhunter, *Arachnothera magna*. Kaeng Krachan NP, Thailand. © Michael Gillam.

mous with biparental care. However, some species, such as the Straight-billed Green Sunbird *Anthreptes rectirostris*, are cooperative breeders, with helpers feeding chicks. The nests of sunbirds are typically pendulous, globular structures with an entrance on one side and often a trailing beard of vegetation hanging beneath. By contrast, spiderhunters typically construct open cup nests or tubes. Nests of both groups are usually constructed from grass, with sunbirds also incorporating lichen, bark, and leaves. Sunbird nests are typically placed low in trees and shrubs, whereas the nests of spiderhunters are often attached with spiderweb to the underside of a palm frond or banana leaf. Generally, only the female constructs the nest. In spiderhunters, both male and female incubate the eggs, whereas in sunbirds, only females incubate. Incubation takes 14 to 15 days. Both male and female sunbirds and spiderhunters feed the chicks, which leave the nest after two or three weeks, and the chicks are at least sometimes attended by the parents for up to two weeks after fledging.

**Conservation** Habitat loss and degradation, largely due to logging and conversion of forests to agriculture, is the primary threat facing the 15 species of nectariniids (11%) that are of conservation concern (8 NT, 4 VU, 3 EN). These include three endangered species: Elegant Sunbird *Aethopyga duyvenbodei*, limited to a single island off of Sulawesi; and the Amani Sunbird *Hedydipna pallidigaster* and Loveridges's Sunbird *Cinnyris loveridgei*, both restricted to extremely small forest reserves in the mountains of eastern Africa.

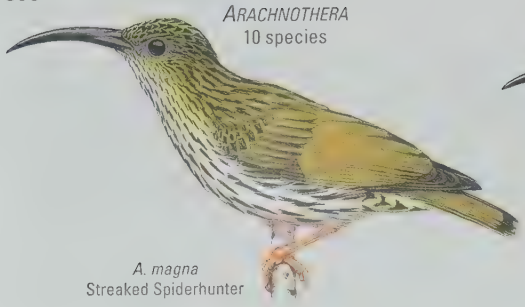
**Relationships** Nectariniidae is part of the passeroid radiation of oscine passerines, within which it is most likely sister to Dicaeidae (Ericson & Johansson 2003, Sefc *et al.* 2003, Beresford *et al.* 2005, Yang *et al.* 2006, Johansson *et al.* 2008b, Nyári *et al.* 2009b, Fjeldså *et al.* 2010, Moyle *et al.* 2011). The clade formed by the sunbirds and flowerpeckers represents one of the older lineages within Passeroidea, and may be in a polytomy with Chloropseidae and Irenidae (Johansson *et al.* 2008b) or sister to a larger group of passeroids, excluding Promeropidae and Modulatricidae (Ericson & Johansson 2003, Barker *et al.* 2004, Beresford *et al.* 2005, Fjeldså *et al.* 2010).



Olive-backed Sunbird, *Cinnyris jugularis*. Sungei Buloh, Singapore. © Con Foley.



Southern Double-collared Sunbird, *Cinnyris chalybeus*. Kirstenbosch Gardens, Cape Town, South Africa. © Kevin Schafer.



*ARACHNOTHERA*
10 species

*A. magna*
Streaked Spiderhunter



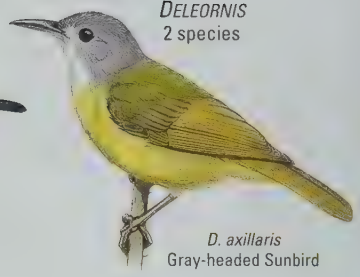
*KUROCHKINEGRAMMA*
1 species

*K. hypogrammicum*
Purple-naped Sunbird



*CHALCOPARIA*
1 species

*C. singalensis*
Ruby-cheeked Sunbird



*DELEORNIS*
2 species

*D. axillaris*
Gray-headed Sunbird



*ANTHREPTES*
14 species

*A. rhodolaemus*
Red-throated Sunbird



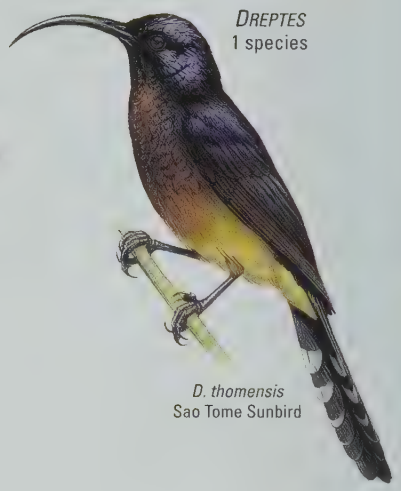
*HEDYDIPNA*
4 species

*H. metallica*
Nile Valley Sunbird



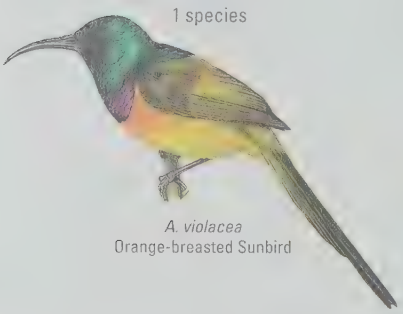
*ANABATHMIS*
3 species

*A. reichenbachii*
Reichenbach's Sunbird



*DREPTES*
1 species

*D. thomensis*
Sao Tome Sunbird



*ANTHOBAPHES*
1 species

*A. violacea*
Orange-breasted Sunbird



*CYANOMITRA*
8 species

*C. alinae*
Blue-headed Sunbird



*CHALCOMITRA*
7 species

*C. adelberti*
Buff-throated Sunbird



*LEPTOCOMA*
5 species

*L. zeylonica*
Purple-rumped Sunbird



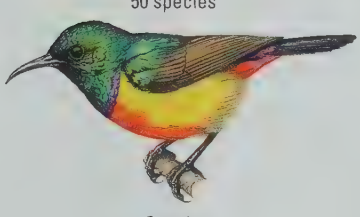
*NECTARINIA*
6 species

*N. famosa*
Malachite Sunbird



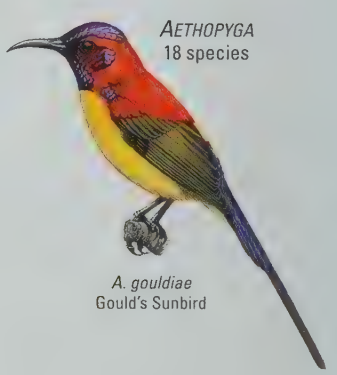
*DREPANORHYNCHUS*
1 species

*D. reichenowi*
Golden-winged Sunbird



*CINNYRIS*
50 species

*C. regius*
Regal Sunbird



*AETHOPYGA*
18 species

*A. gouldiae*
Gould's Sunbird

Passeriformes, Passeroid Oscines

# PRUNELLIDAE
## Accentors

1 genus · 13 species

**Related Families** Peucedramidae (Olive Warbler)

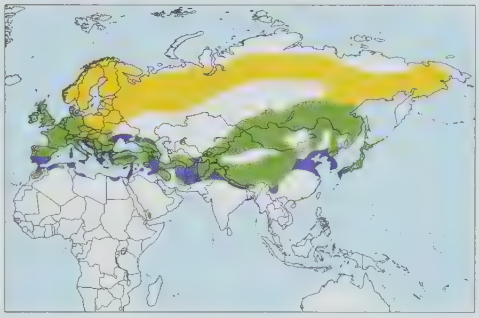
**Similar Birds** Chats (Muscicapidae), sparrows (Passerellidae), buntings (Emberizidae)

**Description**
- Plumage predominantly gray or brown; many with brighter rufous patches or streaks or black pattern on or around face
- Wings and tail medium length
- Body small to medium, cylindrical ovoid, with horizontal posture
- Bill medium-short, slender, finely pointed
- Head small to medium; neck thick
- Legs short; feet and legs stout
- Sexes similar



Rufous-breasted Accentor, *Prunella strophiata*. Rubber Mountains, Qinghai, China. © Dubi Shapiro.





**Habitat** Most accentors breed in montane environments, either above treeline or in high-elevation scrubby woodlands just below treeline. Only the Dunnock *Prunella modularis* breeds in lower-elevation habitats, including gardens, woodlands, and agricultural areas. During the non-breeding season, many other species of accentors descend to lower elevations.

**Food** Accentors forage primarily on the ground, shuffling along with steps or short hops and pecking in rapid succession at the ground. During the breeding season, they feed mostly on insects, even occasionally sallying after insects flying by. Montane species include seeds in their diets all year, and they and the Dunnock shift almost entirely to seeds in the non-breeding season.

**Breeding** The breeding systems of the accentors are very complex. The Dunnock alone has been documented as having monogamous, polygynous, polyandrous, and polygynandrous mating systems, all in one study area; the mating system depends on food availability and female territory size and is driven by both male competition over fertilizations and female competition over male parental care. The Alpine Accentor *P. collaris* is thought to be polygynandrous, with females mating with multiple males who in turn mate with multiple females. Although the mating systems of other species are not well known, they appear to be similar. Accentor nests are relatively simple cups built of grasses, moss, and rootlets, usually placed in a rock crevice, on the ground, under a bush, or in a low shrub. Females typically lay 2 to 5 eggs. Females are responsible for nest construction and incubation, and males that have fathered chicks in a brood generally help provision them. Incubation takes 10 to 15 days, and the chicks leave the nest after 10 to 15 days as nestlings.

**Conservation** Living most often in mountain areas remote from human development, prunellid populations are generally in good shape, and only a single species (7%) is of conservation concern (1 NT). Although it has a stable population, the Yemen Accentor *P. fagani* is known to breed in only six localities in the Arabian Mountains. These areas of relatively high rainfall have been intensively cultivated by humans for millennia, and the accentor's populations would be endangered if anything changed human use of the habitat in the future.

**Relationships** Prunellidae is part of the passeroid radiation of the oscine passerines, although its position within Superfamily Passeroidea is still not fully resolved. In the past, Prunellidae had been allied with many different passerine groups, including Timaliidae and Sylviidae (both with their larger more inclusive memberships), as well as Fringillidae, Turdidae, and Cinclidae. Molecular phylogenetic studies firmly support the placement of Prunellidae within the passeroid radiation and have suggested that Prunellidae is most likely sister to Peucedramidae (Ericson & Johansson 2003). When Peucedramidae is not included in the analysis, Prunellidae looks to be sister to a diverse clade that includes Ploceidae, Motacillidae, Estrildidae, Passeridae, Fringillidae, and the New World nine-primaried oscine radiation (Beresford *et al.* 2005, Johansson *et al.* 2008b, Fjeldså *et al.* 2010), or to the same group without Estrildidae and Ploceidae (Treplin *et al.* 2008).

The accentors are mostly birds of high-mountain meadows, fell fields, scrublands, and forest habitats far more extreme than the gardens and hedgerows occupied by their low-altitude cousin the Dunnock. Details are sparse, but available data indicate that the mating systems of the high-altitude accentors may be just as variable and intriguing as that of the Dunnock; one of the world's plainest birds to look at, it has every mating system known in passerines in a single species. This mating system (or systems!), in which males compete for mating opportunities with females and females compete for parental care from males, is a wonderful contrast to those of virtually all other passerine groups and a laboratory for understanding sexual selection in sexually monomorphic birds.



Alpine Accentor, *Prunella collaris*. Tiger's Nest Monastery, Paro, Bhutan. © Jon Irvine.

*PRUNELLA*
13 species



*P. modularis*
Dunnock

# PEUCEDRAMIDAE

Olive Warbler

1 genus • 1 species

**Related Families** Prunellidae (accentors)

**Similar Birds** Warblers (Parulidae, Acanthizidae, Sylviidae, Phylloscopidae, Cisticolidae)

**Description**
- Plumage of male tawny-orange on head with black mask and dull gray, black, and white body; female duller, with yellow cast to face
- Wings rounded; tail medium length
- Body small, cylindrical ovoid, compact
- Bill medium length, straight, pointed
- Head medium-large; neck short, thick
- Legs medium-short; feet short
- Males more brightly colored than females

**Habitat** The Olive Warbler lives in mature montane pine and pine-oak forests from southern Arizona and New Mexico south to northern Nicaragua.

**Food** Olive Warblers are apparently entirely insectivorous, feeding on a variety of insects and other arthropods.

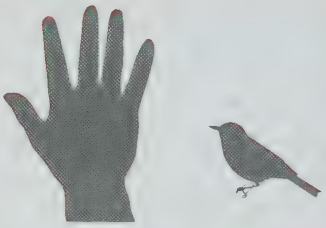
**Breeding** There is little information on the breeding habits of the Olive Warbler; however, it appears to be monogamous with biparental care. The nest of these birds is a small cup, built of small rootlets, moss, lichen, plant down, and spiderwebs, which they construct in a dense clump of pine needles near the edge of the canopy. Olive Warbler females lay 3 or 4 eggs. Only the female incubates and broods the chicks, while the male feeds her. Both male and female feed the chicks, but there is apparently no information on the rate of embryo and chick development.

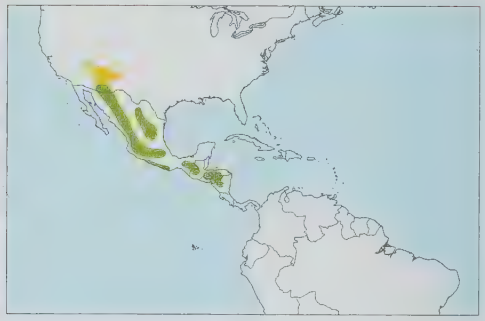
**Conservation** The Olive Warbler faces no immediate conservation concerns.



Olive Warbler, *Peucedramus taeniatus*. Sacatepéquez, Guatemala. © Christopher L. Wood.

**Relationships** The Olive Warbler is the sole member of Peucedramidae. Although it was long thought to be part of Parulidae on the basis of morphology and geography—and sometimes even included in what was then the large parulid genus *Dendroica*—molecular phylogenetic studies have confirmed that the Olive Warbler is instead the sole representative of an old lineage that roots deeply within the large superfamily Passeroidea. The precise placement of Peucedramidae within the early passeroid radiation remains uncertain (Yuri & Mindell 2002), but the best evidence available suggests that it is sister to Prunellidae (Ericson & Johansson 2003).





The Olive Warbler *Peucedramus taeniatus* is interesting in several ways, the first being that its plumage is dominated by colors that are anything but olive, which is restricted to a small patch on the wing feathers and nape. Long lumped in with New World warblers, it is now the sole representative of its family, the only family even close to endemic to North America. Bedecked with a tawny-orange hood and snappy black mask, the male of this species holds forth from pine groves in the mountains of the southwestern United States and Mexico. Its breeding habits are not well known, as this bird is most often seen feeding in mixed-species flocks in the non-breeding season.



Olive Warbler, *Peucedramus taeniatus*. Mount Lemmon, Arizona, USA. © Dubi Shapiro.

*PEUCEDRAMUS*
1 species



*P. taeniatus*
Olive Warbler

Passeriformes, Passeroid Oscines

# UROCYNCHRAMIDAE

Pink-tailed Bunting

1 genus, 1 species

**Related Families** No known close relatives (see Relationships section)

**Similar Birds** Rosefinches (Fringillidae), sparrows (Passerellidae), buntings (Emberizidae)

**Description**

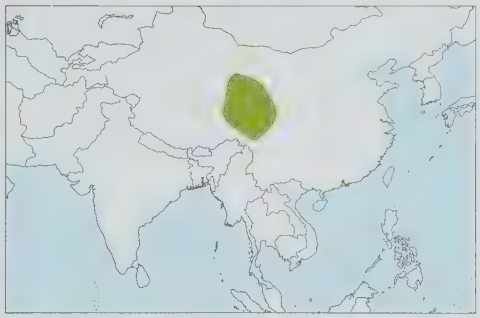
- Male plumage with pale pink wash on breast, brighter pink on face, and streaked pale brown on the back, nape, and crown; female duller brown
- Wings long; tail long, slender
- Body medium-sized, cylindrical ovoid
- Bill medium short, slightly inflated, conical
- Head medium-sized; neck medium in length and thickness
- Legs medium-long; feet small
- Males more brightly colored and with longer tail than females

**Habitat** Pink-tailed Buntings live in shrub-covered mountain slopes in the Quinghai-Tibet Plateau region of central China. They prefer areas dominated by small, dense shrubs, with open patches and streams.



Pink-tailed Bunting, *Urocynchramus pylzowi*. Heimahe, Qinghai, China. © Tang Jun.





This shy and enigmatic songbird from the alpine scrub of central China has long puzzled taxonomists and ornithologists. It has ten primaries, which distinguishes it from many of the taxa in the passeroid cluster, a bill that appears bunting-like externally, but not internally, and a long pink tail that sets it apart from the fringillids. Its song recalls a bunting or a finch, but careful analysis reveals affinities with neither. Generally hiding deep in shrubbery, where it forages in small groups for seeds on and near the ground, and revealing itself only when singing from the top of a bush, this is not an easy bird to study. The first known nest was found only a decade ago.

**Food** Little is known of the diet of Pink-tailed Buntings, though they appear to eat mostly small seeds and flowers, apparently taking insects at least when feeding chicks.

**Breeding** Pink-tailed Buntings are presumed to be monogamous with biparental care. Nests are open cups built mostly of grass, lined with small twigs, roots, and yak hair, and are typically placed low in dense shrubs. Females appear to lay 2 to 4 eggs in a clutch. Apparently, females alone incubate the eggs. Both males and females, or females alone, feed nestlings and fledglings, and one account suggests that the young were fed insects.

**Conservation** The Pink-tailed Bunting does not face any immediate conservation concerns.

**Relationships** Although the Pink-tailed Bunting is part of the superfamily Passeroidea, its position within this radiation has long vexed ornithologists. It has at times been placed in Emberizidae, or with the rosefinches in Fringillidae, as indicated by its other common name, Przewalski's Rosefinch. Although its taxonomic position is still not well resolved, mitochondrial sequence data indicate that the Pink-tailed Bunting is clearly neither an emberizid nor a fringillid (Groth 2000, Gebauer *et al.* 2006, Yang *et al.* 2006). The two published trees, both based on relatively few genes, indicate a polytomy with a handful of clades including Estrildidae, Ploceidae, the clade made up of Prunellidae and Peucedramidae, and a clade made up of the rest of the nine-primaried passeroids (Groth 2000, Yang *et al.* 2006). There is clearly much to be learned about the systematics of this fascinating bird, but we agree with other authors (e.g., Clements *et al.* 2014, Cracraft 2014) in placing the enigmatic Pink-tailed Bunting in its own monotypic family for now.



Pink-tailed Bunting, *Urocynchramus pylzowi*. Rubber Mountains, Qinghai, China. © Dubi Shapiro.

*UROCYNCHRAMUS*
1 species



*U. pylzowi*
Pink-tailed Bunting

# PLOCEIDAE

## Weavers and Allies

15 genera • 116 species

**Related Families** Estrildidae (waxbills), Viduidae (indigobirds and whydahs)

**Similar Birds** Sparrows (Passeridae and Passerellidae), buntings (Emberizidae and Cardinalidae), finches (Fringillidae and Thraupidae)

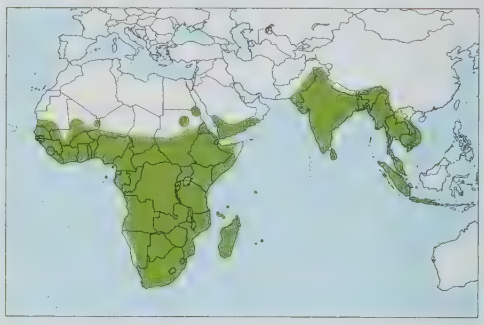
**Description**

- Plumage often with bold black, yellow, orange, or red patterns, or cryptically patterned earth tones
- Wings medium length and rounded; tail medium but very long in some widowbirds
- Body small to medium, ovoid, compact
- Bill short, deep, conical, pointed
- Head medium to large; neck short, thick
- Legs short; feet medium length; both generally stout
- Males generally more brightly colored and boldly patterned than females, and in some species, with elaborate feathers for displays



Thick-billed Weaver, *Amblyospiza albifrons*. Durban Botanical Garden, KwaZulu-Natal, South Africa. © Albie Venter.





**Habitat** The weavers live in a wide variety of open or semi-open habitats, including marshes, open forest, scrubland, grassland, and savanna.

**Food** Ploceid diets are varied: many open-country species feed predominantly on seeds, with a good quantity of insects taken as well, and many other species feed mostly on insects and other arthropods. They also take nectar at times, fruit, pollen, and even the eggs of other birds and other small vertebrates. They forage on insects primarily by gleaning, but also flycatch and probe nuthatch-like in the bark fissures of tree trunks.

**Breeding** Breeding strategies among the weavers and their allies vary from monogamous to polygynous, and from highly colonial to solitary. Some species in the genus *Malimbus* have cooperative nest construction, and in others such as the social weavers, young from previous breeding attempts help feed the chicks of later nests. In polygynous species, males often construct nests or display in territories to attract females. The nests of weavers, usually constructed of grass, reeds, or sticks, are famous for their intricate woven construction. Many different methods of nest construction have been documented, and, indeed, the sparrow-weavers and buffalo-weavers merely push stiff stems together into large amalgamated nest structures rather than weave coherent individ-

Weavers are famous for the intricacy of the knots they make with green grass, resulting, once dried, in remarkably robust and coherent structures. Beyond the nests, themselves, though, this is a fascinating group, with some of the most diverse social and mating systems of any passerine groups. Coloniality is common in these birds, but the most impressive colonial passerines are surely the red-billed queleas, which move across the seasonally unpredictable landscape of southern Africa in search of sufficient germinating grasses to fuel a breeding attempt. They may descend on the woods and fields, making overnight a colony of 30 million nests, and going through their entire breeding cycle in as little as 40 days before moving on.



Speckle-fronted Weaver, *Sporopipes frontalis*. Masai Mara Reserve, Kenya. © Ken Behrens.

ual nests. Nests are often completely enclosed structures, with an entrance from either the bottom or side. Depending on the species, nest placement ranges from high in a tree, often on the delicate long tips of branches, to low in scrubby vegetation. In monogamous species, nests are often constructed by both male and female. Female weavers typically lay 2 to 6 eggs, with 2 being the normal clutch for most species. In polygynous species, females alone incubate eggs and males only occasionally help in feeding the chicks. In monogamous species, both male and female incubate eggs and feed chicks. Incubation takes 10 to 14 days, with 13 to 14 days most common. Nestlings leave the nest as early as 11 days post-hatch, but most take two to three weeks to fledge. Post-fledging care can last at least three weeks.

**Conservation** Habitat loss is the primary threat facing ploceids, 18 species of which (16%) are of conservation concern (6 NT, 5 VU, 7 EN). The endangered Mauritius Fody *Foudia rubra* is limited to a single island in the Indian Ocean, where introduced rats and monkeys, along with conversion of native forest, threaten the few hundred remaining birds. The rest of the endangered weavers (Clarke's Weaver *Ploceus golandi*, Usambara *P. nicolli*, Golden-naped *P. aureonucha*, and Bates's Weavers *P. batesi*) and malimbes (Ibadan Malimbe *Malimbus ibadanensis* and Gola Malimbe *M. ballmanni*) all live in tiny forest fragments scattered across tropical Africa, all of which are threatened by conversion of forests to agricultural use.

**Relationships** Ploceidae is part of the large passeroid radiation of the oscine passerines. Within Passeroidea, though, its position has been difficult to determine, as few studies have tackled its relationship head-on, but rather include the weavers with many other passeroids as outgroups for other focused analyses. Thus, a large study, with better taxon-sampling outside the passeroids, found Ploceidae sister to a clade made up of Motacillidae plus Passeridae (Johansson *et al.* 2008b), but studies with finer taxonomic resolution within the passeroids found Ploceidae sister to Estrildidae (Sefc *et al.* 2003) or Estrildidae plus Viduidae (Sorenson *et al.* 2004, Treplin *et al.* 2008, Fjeldså *et al.* 2010). Ploceidae plus Estrildidae and Viduidae is likely sister to the New World nine-primaried oscine radiation plus Fringillidae, Passeridae, and Motacillidae (Treplin *et al.* 2008, Fjeldså *et al.* 2010).



Southern Masked Weaver, *Ploceus velatus*. Etosha NP, Namibia. © Piotr Jonczyk.



Red-headed Quelea, *Quelea erythrops*.
Ballito, KwaZulu-Natal, South Africa. © Hugh Chittenden.



Baya Weaver, *Ploceus philippinus*.
Lim Chu Kang, Singapore. © Con Foley.



Rufous-tailed Weaver, *Histurgops ruficauda*, Tarangire NP, Tanzania. © Ken Behrens.



*Bubalornis*
2 species

*B. niger*
Red-billed Buffalo Weaver



*Dinemellia*
1 species

*D. dinemelli*
White-headed Buffalo Weaver



*Plocepasser*
4 species

*P. mahali*
White-browed Sparrow-Weaver



*Histurgops*
1 species

*H. ruficauda*
Rufous-tailed Weaver



*Sporopipes*
2 species

*S. frontalis*
Speckle-fronted Weaver



*Pseudonigrita*
2 species

*P. cabanisi*
Black-capped Social Weaver



*Philetairus*
1 species

*P. socius*
Sociable Weaver



*Amblyospiza*
1 species

*A. albifrons*
Thick-billed Weaver



*Quelea*
3 species

*Q. quelea*
Red-billed Quelea



*Euplectes*
17 species

*E. progne*
Long-tailed Widowbird



*Foudia*
6 species

*F. madagascariensis*
Red Fody



*Brachycope*
1 species

*B. anomala*
Brown-tailed Weaver



*Ploceus*
64 species

*P. cucullatus*
Village Weaver



*Malimbus*
10 species

*M. cassini*
Cassin's Malimbe



*Anaplectes*
1 species

*A. rubriceps*
Red-headed Weaver

Passeriformes, Passeroid Oscines

# ESTRILDIDAE
## Waxbills and Allies

34 genera • 134 species

**Related Families** Viduidae (indigobirds and whydahs), Ploceidae (weavers)

**Similar Birds** Indigobirds and whydahs (Viduidae), weavers (Ploceidae), finches (Fringillidae and Thraupidae), manakins (Pipridae)

**Description**
- Plumage in large patches of color, with gray, green, or red accented by contrasting finer patterns in black-and-white, reds, yellows, blues, and greens
- Wings short; tail short to medium-long
- Body very small to small, ovoid, compact
- Bill short, conical, inflated
- Head medium to large; neck short, thick
- Legs and feet short
- Males more colorful and brightly patterned than females

**Habitat** Estrildids live in a wide variety of habitats, most commonly open, ranging from grasslands, savanna, and marshes, to open forests and rainforests.



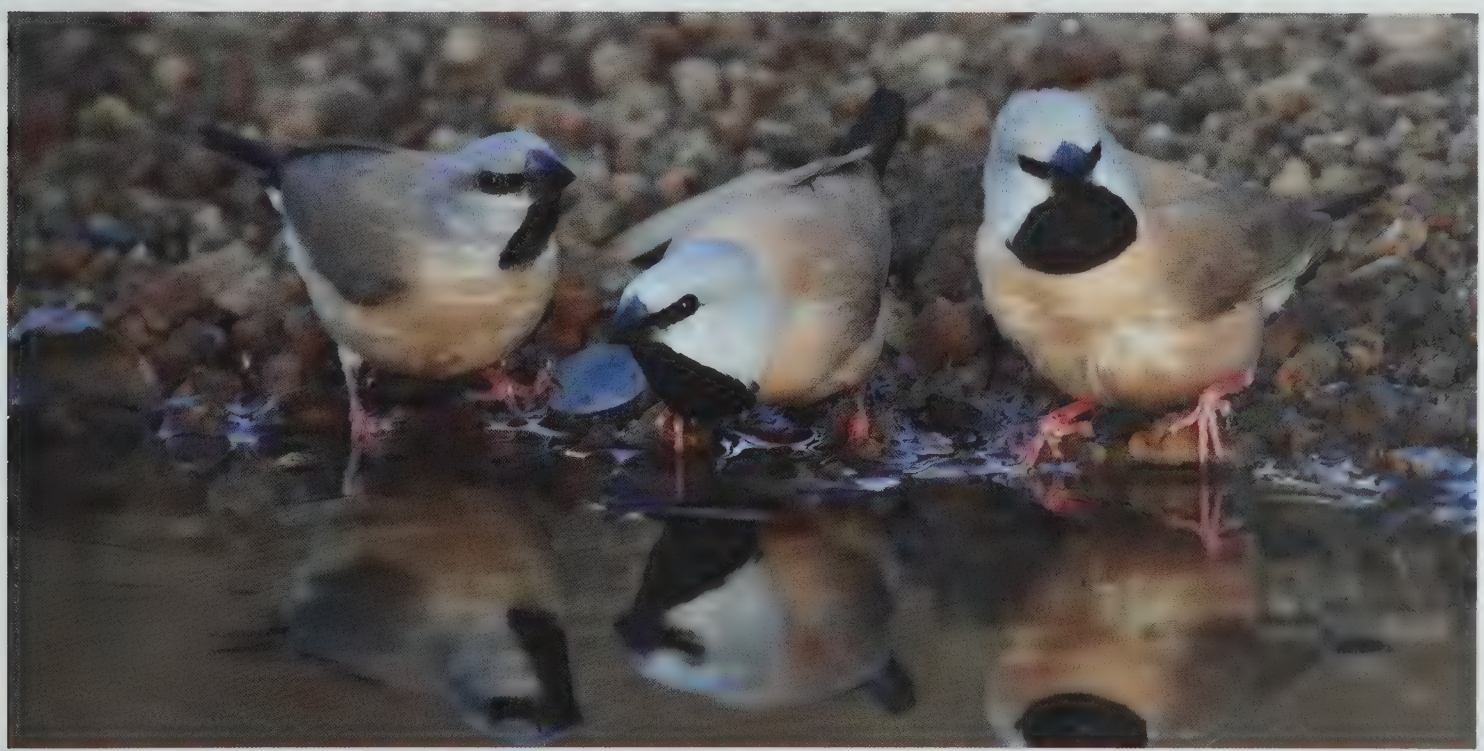
Beautiful Firetail, *Stagonopleura bella*. Melaleuca, South West Tasmania, Australia. © G. B. Baker.



**Food** Most estrildids feed primarily on seeds, with grass seed making up an important part of the diet for many species. In addition, berries, figs, nectar, and filamentous algae are taken by some species, as are insects when they are abundant (e.g., flying termites and ants when emerging) and snails. When foraging for insects, estrildids may glean, probe, or flycatch.

**Breeding** The estrildid finches are monogamous with biparental care. Much of what is known of their breeding and courtship behavior comes from captive breeding. Nests are a woven, covered structure built of grass that may be placed on the ground, low in a bush, in a tree, or, in the case of the Gouldian Finch *Chloebia gouldiae*, in a tree cavity. Both male and female construct nests, with the male often bringing nesting material to the female. Some species build no nest at all, instead using abandoned nests of other species, often those of ploceid weavers. Cooperative breeding is known to occur rarely. In some cases, multiple females will lay their eggs in the same nest. Females typically lay 2 to 6 eggs. Both males and females incubate the eggs and feed the chicks, provisioning the nestlings with seeds throughout their development. Incubation typically takes 12 to 14 days. The chicks fledge after 18 to 21 days in the nest, and the young are fed for up to a couple weeks post-fledging.

These tiny finches of Africa and southern Asia are well known in the pet trade. Admired for their striking plumage and their soft simple songs, estrildids are easy to keep owing to their fondness for seeds. Because they require only seeds to feed their young as well, they are also relatively easy to breed. With bold colors and contrasting broad-brush accents, these lively, flamboyant birds occupy a broad variety of habitats. Gregarious and often colonial, most estrildids are "contact species," huddling together when roosting and often preening their partners. They usually build large domed nests of grass, and in Africa (and only there) the nests of most species are parasitized by the family's sister clade, the viduine finches.



Black-throated Finch, *Poephila cincta*. Cumberland Dam, Georgetown, Queensland, Australia. © Drew Fulton.

Conservation Habitat loss and collection for the pet trade are the primary threats facing the 14 species (10%) of estrildids that are of conservation concern (6 NT, 7 VU, 1 EN). The endangered Gouldian Finch *Chloebia gouldiae* of northern Australia lives in a mosaic of burned and unburned patches of arid woodland and grassland and is affected by shifting fire regimes and feral herbivores across its broad but diffuse range. Many of the vulnerable species have tiny ranges and populations: Shelley's Crimsonwing *Cryptospiza shelleyi* from a small area in the Albertine Rift region in East Africa, Anambra Waxbill *Estrilda poliopareia* from a few localities in southern Nigeria, Pink-billed Parrotfinch *Erythrura kleinschmidti* from two islands in the Fijian archipelago, Green-faced Parrotfinch *Erythrura viridifacies* from only five localities in the Philippines, and Gray-banded Mannikin *Lonchura vana* from the Arfak Mountains in northwestern New Guinea. Most of these are sensitive to the destruction of forest habitats, but the waxbill is a grassland species that would appear likely to benefit from habitat changes in the Niger delta, but is not doing so. The other two vulnerable species, the Green Avadavat *Amandava formosa* of India and the Java Sparrow *Lonchura oryzivora* of Indonesia, had larger ranges but both are now rare and declining. Sensitive to pesticide use and changing land management practices in the grassland areas they frequent, both species have also been trapped extensively for the cage-bird trade.

Relationships Estrildidae is part of the superfamily Passeroidea. Within this large radiation of oscine passerines, the estrildid finches are likely sister to Viduidae (Sorenson *et al.* 2004, Treplin *et al.* 2008, Fjeldså *et al.* 2010). When members of Viduidae are not included in phylogenies, Estrildidae appears sister to Ploceidae (Ericson & Johansson 2003, Johansson *et al.* 2008b). At times, Viduidae has been included within Estrildidae, but we maintain them as separate families in keeping with many recent publications (Clements *et al.* 2014, Cracraft 2014). Within Estrildidae, the two main subfamilies, Lonchurinae and Estrildinae, are sister clades and the listing of genera in them follows Sorenson *et al.* (2004).



Star Finch, *Neochmia ruficauda*. Parry Lagoons Nature Reserve, Western Australia. © Drew Fulton.



Cut-throat Finch, *Amadina fasciata*. Awasa, Ethiopia. © Luke Seitz.



Painted Finch, *Emblema pictum*. N'Dhala Gorge Nature Park, Northern Territory, Australia. © Drew Fulton.

*LAGONOSTICTA*
10 species

*L. senegala*
Red-billed Firefinch

*CLYTOSPIZA*
1 species

*C. monteiri*
Brown Twinspot

*PYTILIA*
5 species

*P. melba*
Melba Finch

*HYPARGOS*
2 species

*H. niveoguttatus*
Peters's Twinspot

*EUSCHISTOSPIZA*
2 species

*E. dybowskii*
Dybowski's Twinspot

*GRANATINA*
2 species

*G. ianthinogaster*
Purple Grenadier

*URAEGINTHUS*
3 species

*U. bengalus*
Red-cheeked Cordon-bleu

*SPERMOPHAGA*
3 species

*S. ruficapilla*
Red-headed Bluebill

*PYRENESTES*
3 species

*P. ostrinus*
Black-bellied Seedcracker

*ESTRILDA*
14 species

*E. astrild*
Common Waxbill

*MANDINGOA*
1 species

*M. nitidula*
Green Twinspot

*CRYPTOSPIZA*
4 species

*C. reichenovii*
Red-faced Crimsonwing

*COCCOPYGIA*
3 species

*C. melanotis*
Swee Waxbill

*NESOCHARIS*
3 species

*N. ansorgei*
White-collared Oliveback

*NIGRITA*
4 species

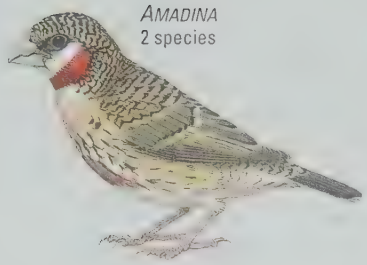
*N. canicapillus*
Gray-headed Negrofinch

*PARMOPTILA*
3 species

*P. rubrifrons*
Red-fronted Antpecker

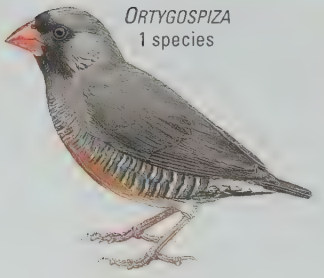
## Subfamily ESTRILDINAE (2 of 2)

### AMADINA
2 species



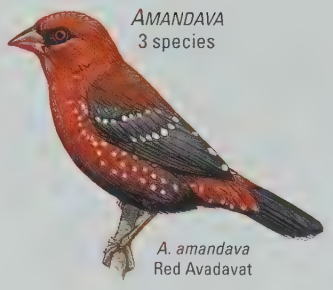
*A. fasciata*
Cut-throat Finch

### ORTYGOSPIZA
1 species



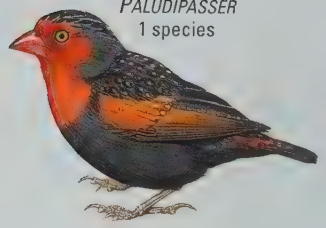
*O. atricollis*
African Quailfinch

### AMANDAVA
3 species



*A. amandava*
Red Avadavat

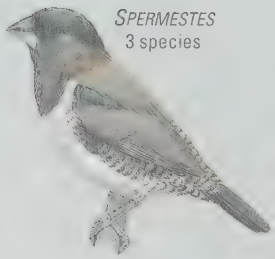
### PALUDIPASSER
1 species



*P. locustella*
Locust Finch

## Subfamily LONCHURINAE

### SPERMESTES
3 species



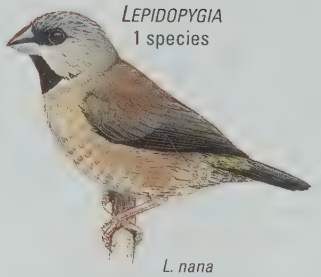
*S. cucullata*
Bronze Mannikin

### ODONTOSPIZA
1 species



*O. griseicapilla*
Gray-headed Silverbill

### LEPIDOPYGIA
1 species



*L. nana*
Madagascar Bibfinch

### EUODICE
2 species



*E. malabarica*
Indian Silverbill

### LONCHURA
30 species



*L. malacca*
Tricolored Munia

### HETEROMUNIA
1 species



*H. pectoralis*
Pictorella Finch

### STAGONOPLEURA
3 species



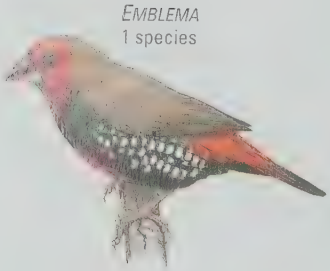
*S. guttata*
Diamond Firetail

### OREOSTRUTHUS
1 species



*O. fuliginosus*
Mountain Firetail

### EMBLEMA
1 species



*E. pictum*
Painted Finch

### NEOCHMIA
4 species



*N. phaeton*
Crimson Finch

### POEPHILA
3 species



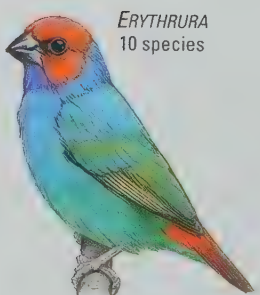
*P. acuticauda*
Long-tailed Finch

### TAENIOPYGIA
3 species



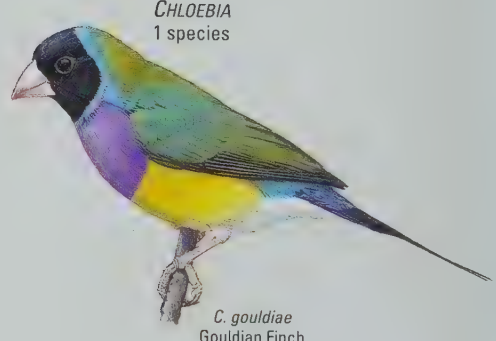
*T. castanotis*
Australian Zebra Finch

### ERYTHRURA
10 species



*E. cyaneovirens*
Red-headed Parrotfinch

### CHLOEBIA
1 species



*C. gouldiae*
Gouldian Finch

Passeriformes, Passeroid Oscines

# VIDUIDAE
## Whydahs and Indigobirds

2 genera • 20 species

**Related Families** Estrildidae (waxbills), Ploceidae (weavers)

**Similar Birds** Finches (Estrildidae, Fringillidae, Thraupidae), buntings (Cardinalidae), manakins (Pipridae)

**Description**
- Plumage of male whydahs dominated by striking earth-toned patterns and plumes; male indigobirds all glossy blue-black; females brown
- Wings rounded; tail short in indigobirds and female whydahs, extremely long and ornate in male whydahs
- Body size very small to small, ovoid, compact
- Bill short, conical
- Head medium to large; neck short, thick
- Legs short; feet medium length
- Sexually dimorphic; males more brightly colored and boldly patterned than females

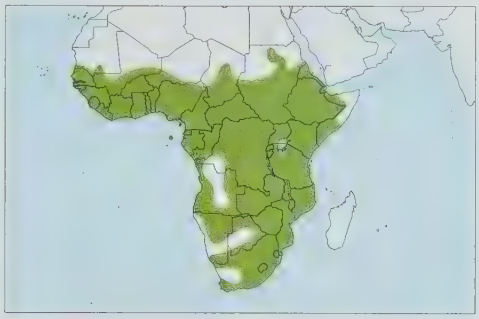
**Habitat** Whydahs and indigobirds live in a variety of terrestrial habitats but show a preference for open areas, including savanna, scrub, grassland, and agricultural areas.

**Food** Viduids feed primarily on seeds, but also will take fruits and insects. During termite hatches, birds will take advantage of this momentarily abundant food source.



Shaft-tailed Whydah, *Vidua regia*. Windhoek, Namibia. © Ken Behrens.





**Breeding** Whydahs and indigobirds are promiscuous, with males courting several females and females occasionally mating with several males. No species provide any parental care, and the female lays her eggs in the nest of an estrildid host after carefully watching nest construction. Viduid parents of most species do not harm the eggs of their host, and the host pair are often able to raise some of their own chicks successfully as well as those of the parasite. Cuckoo Finches *Anomalospiza imberbis* are the only viduids that do not parasitize estrildids, laying their eggs instead in the nests of prinias and cisticolas (Cisticolidae). They are also unusual in that the female removes host eggs before laying her own.

**Conservation** No viduid species faces immediate conservation concerns.

This is an entire family of brood parasites, all but one species parasitizing estrildid finches, this family's sister clade. Male whydahs court their mates with exaggerated tail plumes and postures, whereas indigobirds serenade females with a series of songs that they learn from other species, usually their hosts. The remarkable similarity in mouth markings between the chicks of viduines and their estrildid hosts has been interpreted as the result of an ongoing arms race between parasite and host. Curiously though, estrildids in Asia, where viduines are absent, are just as variable in their mouth markings as are their relatives in Africa: this diversity does not seem to be driven by ongoing selective pressure from their brood parasites.



Village Indigobird, *Vidua chalybeata*. Debre Libanos, Ethiopia. © Ken Behrens.

**Relationships** The indigobirds and whydahs are part of Passeroidea, a large superfamily of the oscine passerines. At times treated as part of Estrildidae, the parasitic viduid finches are here treated as a distinct family, which is pretty clearly sister to Estrildidae (Sorenson *et al.* 2004, Treplin *et al.* 2008, Fjeldså *et al.* 2010). The clade formed by Viduidae and Estrildidae is sister to Ploceidae (Sorenson *et al.* 2004, Treplin *et al.* 2008, Fjeldså *et al.* 2010).



Long-tailed Paradise Whydah, *Vidua paradisaea*. Awash NP, Ethiopia. © Luke Seitz.

*VIDUA*
19 species

*V. macroura*
Pin-tailed Whydah

*ANOMALOSPIZA*
1 species

*A. imberbis*
Cuckoo-Finch

Passeriformes, Passeroid Oscines

# PASSERIDAE
## Old World Sparrows

8 genera • 41 species

**Related Families** Fringillidae (finches and allies), Motacillidae (pipits and wagtails), the 15 families of the New World nine-primaried oscines

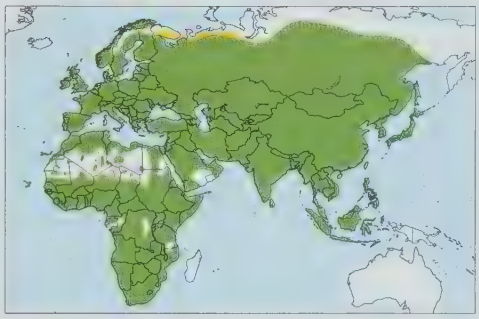
**Similar Birds** New World sparrows (Passerellidae), Old World buntings (Emberizidae), longspurs (Calcariidae), finches (Fringillidae and Thraupidae)

**Description**
- Plumage brown or gray with contrasting patterns in black, yellow, rufous, or white
- Wings medium-long, pointed; tail medium-long
- Body small to medium, cylindrical ovoid, robust
- Bill short to medium, inflated conical
- Head large; neck thick
- Legs and feet short and stout
- Males usually more boldly patterned and brightly colored than females



Somali Sparrow, *Passer castanopterus*. Sanshan'ade, Somalia. © Nik Borrow.





**Habitat** The Old World sparrows live in open habitats, from agricultural fields and grasslands, savanna, desert, and semi-desert scrub through open woodland, and from coastal pans to alpine tundra. Several of the *Passer* sparrows tolerate human activity extremely well and are often found as commensals in villages, urban areas, and farmland.

**Food** Most of the Old World sparrows are primarily granivorous. Some species rely more heavily on insects than others, and all species feed insects and other invertebrates to their chicks. Although most species primarily forage on the ground for seeds, they will forage in bushes and trees when they are also searching for insect prey.

**Breeding** Old World sparrows are monogamous with biparental care. Pairs form strong pair bonds, and in some cases remain paired through multiple breeding seasons. Most species nest at least semi-colonially, and often in dense colonies, with the degree of coloniality depending on the availability of nest sites. The *Passer* sparrows nest most often in cavities or abandoned closed nests. The high-altitude snowfinches nest in rock crevices, and ground-sparrows nest in burrows in the ground originally dug by small mammals. The nest itself is similar across most species, being a domed structure of woven grass, stems, feathers, and other items. Species in this family that nest outside of cavities, such as the Chestnut Sparrow *Passer eminibey* and the Dead Sea Sparrow *P. moabiticus*, build more substantial structures constructed with sticks as well as grass and other

Although these plain-clothed, sturdy little birds eat a diet rich in seeds, they supplement it with insects, especially during the breeding season. Indeed, their chicks subsist almost exclusively on invertebrates for the first few months of their lives. Still, passerids have special modifications of the palate and tongue with which they husk the many seeds they ingest. Granivory enables them to endure in some of the most extreme desert and alpine environments in the world. It is therefore perhaps no accident that the House Sparrow *Passer domesticus*, via human introductions, has spread and thrived over almost all of Earth's land surface or that it has been one of the best-adapted commensals of humans for millennia.



Yellow-spotted Bush Sparrow, *Gymnoris pyrgita*. Masai Mara Reserve, Kenya. © Francesco Veronesi.

materials. The sparrows typically lay 3 to 5 eggs. In some species, females undertake most of the breeding responsibilities, but generally both parents are active in all aspects. Males are very active in nest-building, often building most of the initial structure. Both male and female incubate the eggs, although females typically spend more time incubating eggs. Incubation takes 10 (rarely) to 14 days. Both male and female feed the chicks, which fledge after about 13 to 17 days in the nest and are fed by the parents for up to a couple weeks post-fledging.

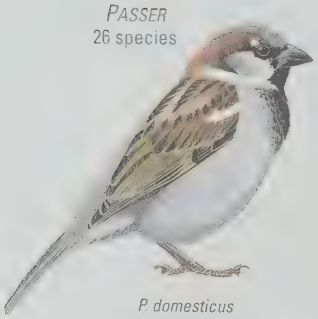
Conservation No Old World sparrow species faces immediate conservation concerns, and many have instead adapted to and benefited from human settlement and activity.

Relationships Passeridae is part of the superfamily Passeroidea, a large radiation of the oscine passerines. Molecular phylogenetic studies suggest that the Old World sparrows are sister to a clade that includes Fringillidae, Motacillidae, and the New World nine-primaried oscines (Barker *et al.* 2004, Johansson *et al.* 2008b, Treplin *et al.* 2008, Fjeldså *et al.* 2010). An alternative arrangement suggests that Passeridae is sister to Fringillidae and that those two families together are in turn sister to the New World nine-primaried oscines plus Motacillidae (Ericson & Johansson 2003) or in a polytomy with them (Yang *et al.* 2006). The Cinnamon Ibon *Hypocryptadius cinnamomeus*, long thought to be in Zosteropidae, is here placed in Passeridae, where it is sister to the rest of the family (Fjeldså *et al.* 2010), and sometimes separated into its own family (Cracraft 2014).



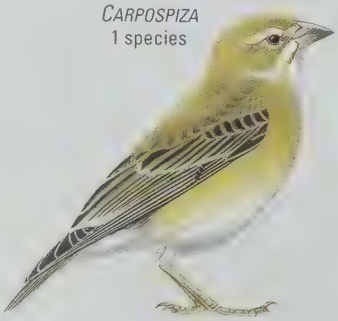
Rufous-necked Ground Sparrow, *Pyrgilauda ruficollis*. Koko Nor, Qinghai, China. © Tang Jun.

*PASSER*
26 species



*P. domesticus*
House Sparrow

*CARPOSPIZA*
1 species



*C. brachydactyla*
Pale Rock Sparrow

*PETRONIA*
1 species



*P. petronia*
Common Rock Sparrow

*GYMNORIS*
4 species



*G. xanthocollis*
Chestnut-shouldered Bush Sparrow

*MONTIFRINGILLA*
3 species



*M. nivalis*
White-winged Snowfinch

*ONYCHOSTRUTHUS*
1 species



*O. taczanowskii*
White-rumped Ground Sparrow

*PYRGILAUDA*
4 species



*P. ruficollis*
Rufous-necked Ground Sparrow

*HYPOCRYPTADIUS*
1 species



*H. cinnamomeus*
Cinnamon Ibon

Passeriformes, Passeroid Oscines

# MOTACILLIDAE
## Pipits and Wagtails

8 genera · 67 species

**Related Families** Fringillidae (finches and allies), the 15 other families of the New World nine-primaried oscines

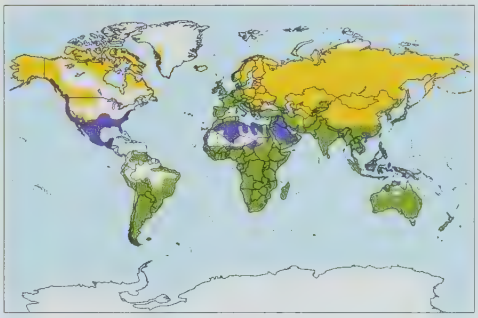
**Similar Birds** Larks (Alaudidae), thrushes (Muscicapidae, Turdidae), meadowlarks (Icteridae)

**Description**
- Pipits brown, streaky, and cryptic; longclaws colorful below; wagtails boldly patterned with white, gray, black, and yellow
- Wings medium to medium-long, often pointed; tail medium to long and slender
- Body small to medium, cylindrical ovoid, slender
- Bill short to medium, straight, slender
- Head small; neck short
- Legs medium-long; feet large, with elongated hallux claw
- Males sometimes more brightly colored and boldly patterned



Yellow Wagtail, *Motacilla flava*. Near Biebrza NP, Poland. © Mark A. Chappell.





These thin, long-tailed birds with long claws on the hallux are birds of grasslands, pastures, and prairies. Pipits have muted brown plumages, and wagtails are more dapper in their shades of gray, black, and white, often with a patch or wash of yellow. Longclaws combine the browns of one with the yellow (or even red) splashes of the other, and they bear an uncanny resemblance to the meadowlarks (Icteridae) of the New World, in appearance and in their melodious whistled songs. They all share the white outer tail feathers so characteristic of birds of open country. Although only the wagtails translate the meaning of their family's Latin name (*Motacilla* means "moving tail"), most motacilids constantly pump their long tails as they walk.

**Habitat** Most motacillids are birds of open habitats, including grasslands, tundra, and savanna, though a few species live in more-wooded habitats.

**Food** Motacillids are primarily insectivorous, often adding to their diet spiders and worms, as well as small crustaceans, snails, and even small vertebrates when feeding near water. Birds forage primarily on the ground, picking prey off the ground as well as making short flights to catch insects in the air. When insects are scarce, many species also feed on seeds and berries.

**Breeding** Pipits, wagtails, and longclaws are primarily monogamous with biparental care, though both polyandry and polygyny have been observed rarely in well-studied species. Most construct a cup-shaped nest of grasses, rootlets, leaves, and other materials, which is well-hidden on the ground beneath a bush or nestled within a tussock. Many species place the nest in a hollow that they excavate or in the hoof print of a mammal. Females typically lay 2 to 6 eggs. Nest construction responsibilities vary, with both the male and female participating in some species, and only the female in others. Incubation, too, is by both sexes or by the female alone, and it takes from 11 to 14 days. Both parents feed the chicks, and the chicks leave the nest after 11 to 14, and occasionally up to 17 days. Care of the fledged young usually lasts more than two weeks and sometimes up to eight weeks post-fledge.

**Conservation** Habitat loss is the primary threat, putting 15% of motacillid species at risk (4 NT, 3 VU, 3 EN). The endangered Sokoke Pipit *An-*



Paddyfield Pipit, *Anthus rufulus*. Near Changi Airport, Singapore. © Con Foley.

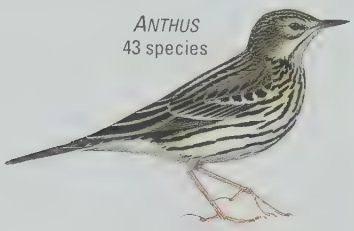
*thus sokokensis*, limited to fewer than ten forest patches along the East African coast, and the Rufous-throated White-eye *Madanga ruficollis*, from hill forests on the Wallacean island of Buru, are both threatened by forest conversion to agriculture. The endangered Sharpe's Longclaw *Macronyx sharpei*, living in grassland fragments in the southern Kenyan highlands, is threatened by conversion of grasslands to intensive agriculture or tree farms.

**Relationships** The pipits and wagtails are part of the superfamily Passeroidea. Although their position within this large radiation of the oscine passerines is not fully resolved, most recent phylogenetic studies place Motacillidae as sister to the clade made up of Fringillidae and the New World nine-primaried oscines (Johansson *et al.* 2008b, Treplin *et al.* 2008, Fjeldså *et al.* 2010). An alternative arrangement, less well supported, suggests that Motacillidae is sister to the New World nine-primaried oscines excluding Fringillidae (Ericson & Johansson 2003) or in a polytomy with them (Yang *et al.* 2006). Within Motacillidae, there are either two or three main clades (Outlaw & Voelker 2006b, Alström *et al.* 2015). We follow the recent molecular evidence by Alström *et al.* in moving two aberrant island forms to this family: *Madanga* from Zosteropidae and *Amaurocichla* from Sylviidae. As Alström *et al.* point out, this creates paraphyly in both *Anthus* and *Motacilla*, and further taxonomic revision is needed.



Rosy-breasted Longclaw, *Macronyx ameliae*. Manguzi, KwaZulu-Natal, South Africa. © Hugh Chittenden.

*ANTHUS*
43 species



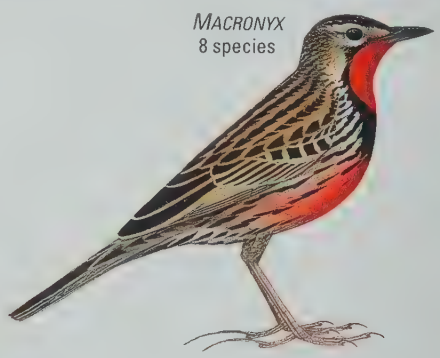
*A. gustavi*
Pechora Pipit

*MADANGA*
1 species



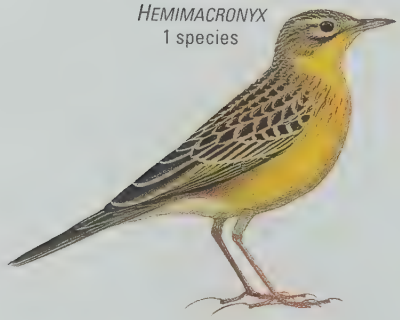
*M. ruficollis*
Rufous-throated White-eye

*MACRONYX*
8 species



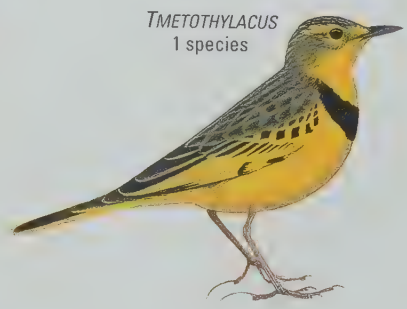
*M. ameliae*
Rosy-breasted Longclaw

*HEMIMACRONYX*
1 species



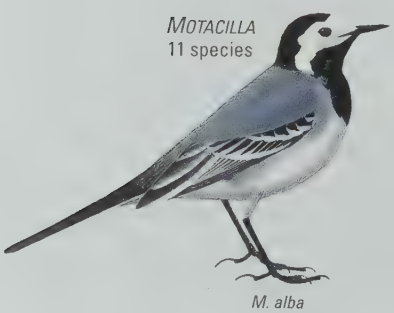
*H. chloris*
Yellow-breasted Pipit

*TMETOTHYLACUS*
1 species



*T. tenellus*
Golden Pipit

*MOTACILLA*
11 species



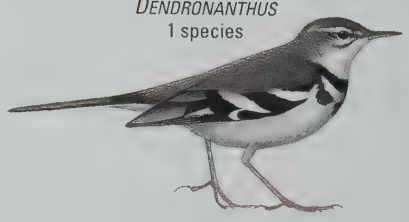
*M. alba*
White Wagtail

*AMAUROCICHLA*
1 species



*A. bocagii*
Bocage's Longbill

*DENDRONANTHUS*
1 species



*D. indicus*
Forest Wagtail

Passeriformes, Passeroid Oscines

# FRINGILLIDAE
## Finches and Allies

49 genera • 201 species

**Related Families** Passeridae (Old World sparrows), 15 families in the New World nine-primaried oscines

**Similar Birds** Sparrows (Passerellidae and Passeridae), buntings (Emberizidae and Cardinalidae), finches (Thraupidae, Estrildidae, Viduidae), flowerpeckers (Dicaeidae)

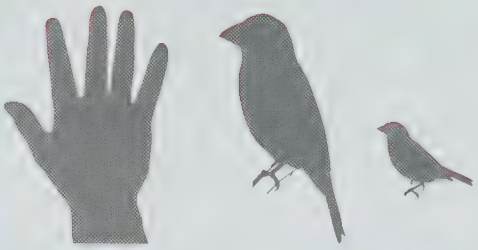
**Description**
- Plumages vary from streaked with highlights of yellow or red to large matte patches of color in yellow, green, orange, red, black, rufous, or blue
- Wings medium-long, often pointed; tail short to medium
- Body small to medium, cylindrical ovoid, compact
- Bill generally short to medium, conical, and often deep and sharply pointed; slightly inflated in Euphoniinae; distinctly crossed in *Loxia*; variable and specialized in Hawaiian honeycreepers
- Head large; neck short, thick
- Legs short; feet medium to large
- Males most often more brightly colored than females

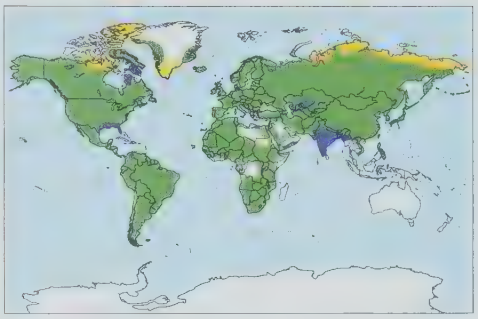
**Habitat** Fringillids live in diverse habitats, from arid lowland scrub and savanna to dense tropical rainforests and high alpine talus slopes.

**Food** Most finches feed primarily on seeds, fruit, and other vegetable matter. Many, particularly those of cold Northern Hemisphere habitats, are nomadic, traveling large distances in search of good seed crops. Many Northern Hemisphere species are also quite specialized for different types of seeds. The *Loxia* crossbills are near the extreme end of this specialization, with uniquely crossed mandibles suitable for prying open conifer cones to extract the seeds. The Hawaiian honeycreepers, widely known for their diversity of bill shapes and sizes leading to strong feeding specialization, contain species specializing on nectar, seeds, nuts, or insects.



European Goldfinch, *Carduelis carduelis*. Near Warsaw, Poland. © Paweł Wacławik.





Fringillids vary widely, from the streaky brown of the European Twite to the brilliant colors of Neotropical euphonias, and from the sharp, simple bills of siskins to the massive seed-crackers of hawfinches and the chisels and decurved probes of Hawaiian honeycreepers. Yet this diversity masks some interesting shared traits. They are almost universally fond of fruits and seeds, so much so that even the nestlings are reared on them. Their mobility helps explain why they are the most widely distributed of all the nine-primaried oscines—and also why it is no big surprise that the spectacular diversification of Hawaii's honeycreepers was seeded by a fringillid ancestor that colonized this isolated archipelago many millions of years ago.

*Fringilla* species feed their young insects, but the others feed their young seeds or fruit.

**Breeding** Fringillids are monogamous with biparental care. Some nomadic species, such as *Loxia* crossbills, have been recorded nesting in all months of the year, and are limited only by the availability of conifer seeds for food. Others, such as the American Goldfinch *Spinus tristis*, nest relatively late in the summer, once their preferred nestling food, thistle seed, has ripened. Most fringillids build open cup-shaped nests of grass, twigs, rootlets, and other materials, most often placed in a tree or shrub, though alpine species place their nests in a crack in the rocks or under a cliff ledge, and euphonias build a dome nest with a side entrance. Nests of some species are often lined with feathers or plant down. Females typically lay 2 to 7 eggs, and euphonias lay large clutches for a tropical frugivore (2 to 5 eggs). Females generally build the nest and seem always, alone, to incubate. Across the breadth of environments these birds occupy, incubation can take as little as 9 days or as much as 19, but the eggs of most species hatch after 12 to 14 days. Nestlings fledge after about 10 to 27 days, and the young are cared for post-fledge for up to two weeks or so in the temperate zone and for more than a year in some Hawaiian species. In most species, both male and female feed the chicks.



Yellow-throated Euphonia, *Euphonia hirundinacea*. Cobá, Quintana Roo, Mexico. © Ian Davies.

**Conservation** The 36 fringillid species at risk (18%) are threatened primarily by habitat destruction and introduced predators (7 NT, 10 VU, 9 EN, 7 CR, 3 CR(PE)). The endangered Red Siskin *Spinus cucullata*, once widespread in the foothills of northern Venezuela and Guyana, has been all but annihilated in the wild by trapping for the cage-bird trade. Two endangered fringillids in Somalia (Warsangli Linnet *Acanthis johannis*) and Ethiopia (Yellow-throated Seedeater *Serinus flavigula*) were never known to be widespread, and both are limited to a few patches of hill desert scrub, threatened by fire and the encroachment of agriculture. The critically endangered Sao Tome Grosbeak *Neospiza concolor* and endangered Hispaniolan Crossbill *Loxia megaplaga* and Azores Bullfinch *Pyrrhula murina* are threatened by introduced predators

and by habitat destruction and conversion. All of these problems with endemic island populations are eclipsed by the demise of the Hawaiian honeycreeper radiation. Many species in this distinctive clade have already gone extinct, and of the 20 species that may still remain only two have a conservation status of least concern. Three are critically endangered and possibly extinct and six are critically endangered, all due to multiple insults: the clearance of native forest, the introduction of predatory and habitat-destroying mammals, and the introduction in the 19th century of mosquitoes carrying avian malaria, to which the native birds had no resistance.

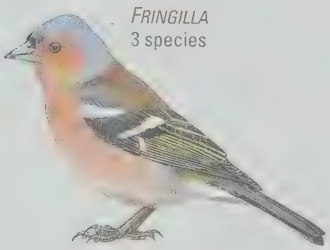
**Relationships** Fringillidae is part of the large radiation of oscine passerines known as the superfamily Passeroidea. Though one well-sampled molecular study suggested that Fringillidae is sister to Passeridae (Ericson & Johansson 2003), the vast majority of studies have indicated that Fringillidae is sister to the large New World nine-primaried oscine radiation (Yuri & Mindell 2002, Johansson *et al.* 2008b, Treplin *et al.* 2008, Fjeldså *et al.* 2010, Zuccon *et al.* 2012, Barker *et al.* 2013). Within Fringillidae, there are three distinct subfamilies: Fringillinae, consisting of only two species, is sister to the remaining members of the family (Lerner *et al.* 2011, Zuccon *et al.* 2012, Barker *et al.* 2013). Euphoniinae, which at one time was part of Thraupidae, is sister to Carduelinae. Carduelinae can further be broken into five tribes, including Drepanini, the Hawaiian honeycreepers, which at times have been separated into their own family (James 2004, Lerner *et al.* 2011, Zuccon *et al.* 2012).



White-winged Crossbill, *Loxia leucoptera*. Salisbury Beach State Reservation, Massachusetts, USA. © Ian Davies.

Subfamily **FRINGILLINAE**

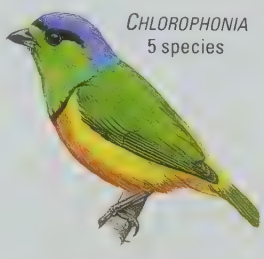
*FRINGILLA*
3 species



*F. coelebs*
Common Chaffinch

Subfamily **EUPHONIINAE**

*CHLOROPHONIA*
5 species



*C. pyrrhophrys*
Chestnut-breasted Chlorophonia

*EUPHONIA*
27 species



*E. anneae*
Tawny-capped Euphonia

Subfamily **CARDUELINAE** (1 of 3)
Tribe **Coccothraustini**

*MYCEROBAS*
4 species



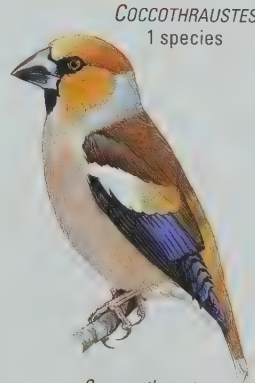
*M. affinis*
Collared Grosbeak

*HESPERIPHONA*
2 species



*H. vespertina*
Evening Grosbeak

*COCCOTHRAUSTES*
1 species



*C. coccothraustes*
Hawfinch

*EOPHONA*
2 species



*E. migratoria*
Yellow-billed Grosbeak

## Tribe **Drepanini**

*MELAMPROSOPS*
1 species



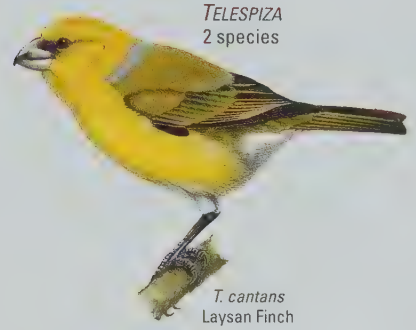
*M. phaeosoma*
Poo-uli

*PAROREOMYZA*
2 species



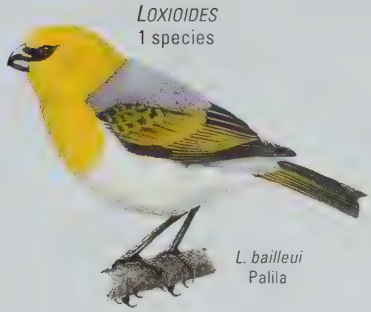
*P. maculata*
Oahu Alauahio

*TELESPIZA*
2 species



*T. cantans*
Laysan Finch

*LOXIOIDES*
1 species



*L. bailleui*
Palila

*PSITTIROSTRA*
1 species



*P. psittacea*
Ou

*OREOMYSTIS*
1 species



*O. bairdi*
Akikiki

*MAGUMMA*
1 species



*M. parva*
Anianiau

*LOXOPS*
4 species



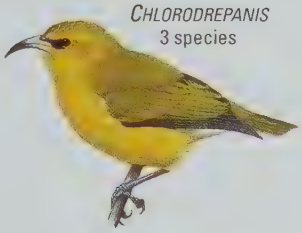
*L. coccineus*
Hawaii Akepa

*MANUCERTHIA*
1 species



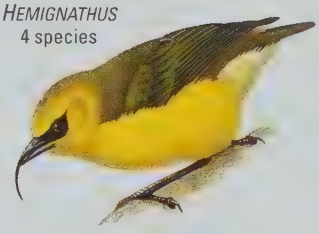
*M. mana*
Hawaii Creeper

*CHLORODREPANIS*
3 species



*C. stejnegeri*
Kauai Amakihi

*HEMIGNATHUS*
4 species



*H. wilsoni*
Akiapolaau

*PSEUDONESTOR*
1 species



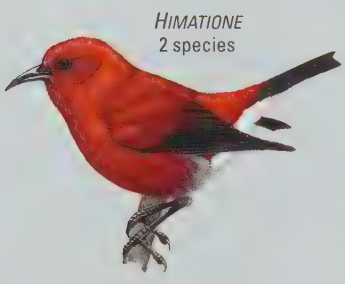
*P. xanthophrys*
Maui Parrotbill

*VESTIARIA*
1 species



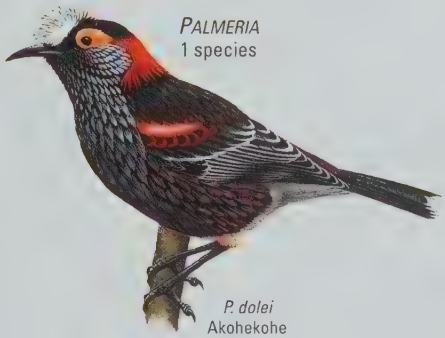
*V. coccinea*
Iiwi

*HIMATIONE*
2 species



*H. sanguinea*
Apapane

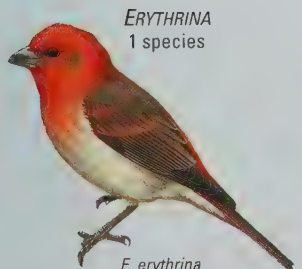
*PALMERIA*
1 species



*P. dolei*
Akohekohe

## Tribe **Carpodacini**

*ERYTHRINA*
1 species



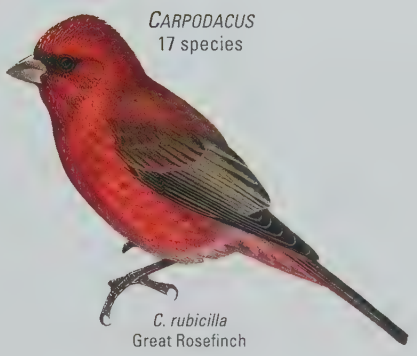
*E. erythrina*
Common Rosefinch

*HAEMATOSPIZA*
1 species



*H. sipahi*
Scarlet Finch

*CARPODACUS*
17 species

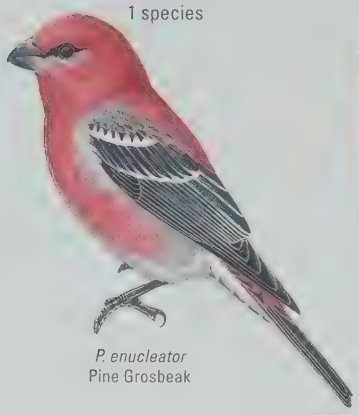


*C. rubicilla*
Great Rosefinch

## Subfamily **Carduelinae** (3 of 3)

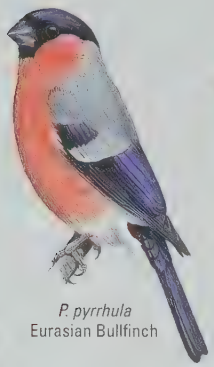
### Tribe **Pyrrhulini**

*Pinicola*
1 species



*P. enucleator*
Pine Grosbeak

*Pyrrhula*
7 species



*P. pyrrhula*
Eurasian Bullfinch

*Rhodopechys*
1 species



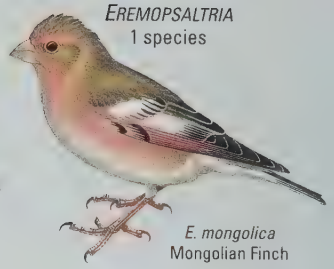
*R. sanguineus*
Crimson-winged Finch

*Bucanetes*
1 species



*B. githagineus*
Trumpeter Finch

*Eremopsaltria*
1 species



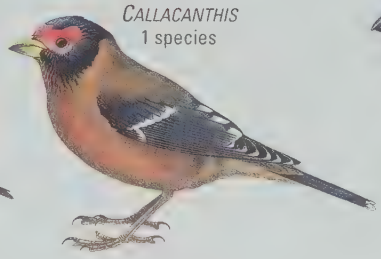
*E. mongolica*
Mongolian Finch

*Agraphospiza*
1 species



*A. rubescens*
Blanford's Rosefinch

*Callacanthis*
1 species



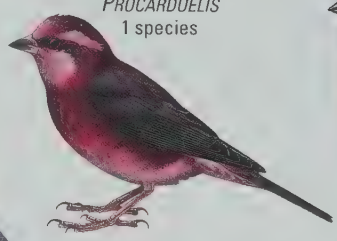
*C. burtoni*
Spectacled Finch

*Pyrrhoplectes*
1 species



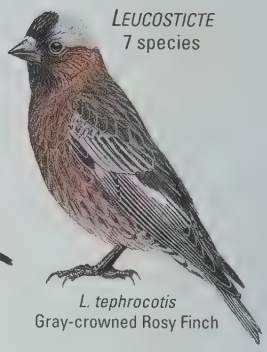
*P. epauletta*
Gold-naped Finch

*Procarduelis*
1 species



*P. nipalensis*
Dark-breasted Rosefinch

*Leucosticte*
7 species



*L. tephrocotis*
Gray-crowned Rosy Finch

### Tribe **Carduelini**

*Haemorhous*
3 species



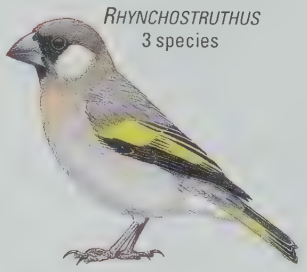
*H. mexicanus*
House Finch

*Rhodospiza*
1 species



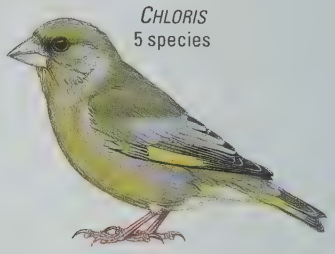
*R. obsoleta*
Desert Finch

*Rhynchostruthus*
3 species



*R. percivali*
Arabian Grosbeak

*Chloris*
5 species



*C. chloris*
European Greenfinch

*Linurgus*
1 species



*L. olivaceus*
Oriole Finch

*Crithagra*
32 species



*C. mozambica*
Yellow-fronted Canary

*Neospiza*
1 species



*N. concolor*
Sao Tome Grosbeak

*Linaria*
2 species



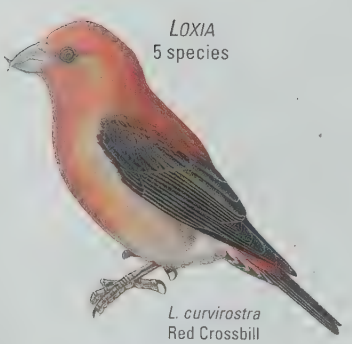
*L. cannabina*
Common Linnet

*Acanthis*
5 species



*A. flammea*
Common Redpoll

*Loxia*
5 species



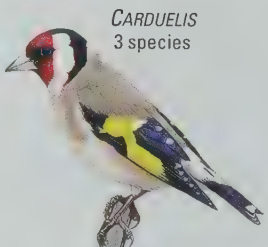
*L. curvirostra*
Red Crossbill

*Chrysocorythus*
1 species



*C. estherae*
Mountain Serin

*Carduelis*
3 species



*C. carduelis*
European Goldfinch

*Serinus*
8 species



*S. serinus*
European Serin

*Spinus*
20 species



*S. spinus*
Eurasian Siskin

Passeriformes, Passeroid Oscines

# CALCARIIDAE
## Longspurs

3 genera • 6 species

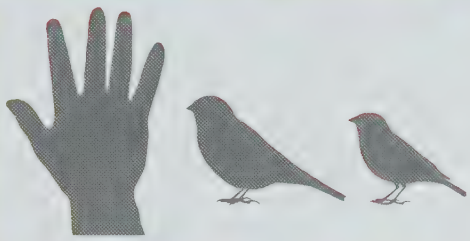
**Related Families** The other 14 families in the New World nine-primaried oscines

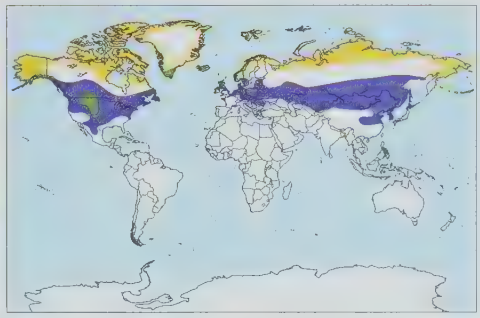
**Similar Birds** Old World buntings (Emberizidae), New World sparrows (Passerellidae), Old World sparrows (Passeridae)

**Description**
- Basic plumage brown and streaky, with patches of white in tail, wearing to bold patterns of black, white, chestnut, and orange in summer
- Wings medium-long, pointed; tail medium-long
- Body medium-sized, cylindrical ovoid
- Bill short, conical, slightly inflated
- Head medium-sized; neck medium thickness and length
- Legs medium-short; feet medium-sized, with long hallux claw
- Males more brightly colored and boldly patterned than females



Chestnut-collared Longspur, *Calcarius ornatus*. Grasslands NP, Saskatchewan, Canada. © Nick Saunders.





The longspurs and *Plectrophenax* buntings are birds of open country that move south from northern breeding areas in huge flocks during the winter. Most are endemic to North America, with a locus of diversity centered on the North American prairies and Arctic. Plumages in this family, marked with bold patterns of black and white with chestnut, gray, and even bright orange mixed in, transition from their winter to spring aspect through wear, not molt. Like most other open-country passerines, these birds have white in their outer tail feathers, perhaps as a signal to facilitate their non-breeding gregariousness. Their streaky plumages can make them almost invisible on open, broken fields, and they often are revealed only by their rattled call notes.

**Habitat** Calcariids live exclusively in open habitats. Two *Calcarius* longspurs and both *Plectrophenax* buntings breed in the Arctic tundra, whereas the other two longspurs breed in the American prairies. In the winter, all are found in open areas, such as plowed fields, beaches, and open prairie, where they gather in large flocks.

**Food** Longspurs and snow buntings feed on seeds and fruit almost exclusively in the winter months. On the breeding grounds, they transition from seeds to insects as they become available with the advance of spring, and they feed their young an insect diet.

**Breeding** Most calcariids are socially monogamous with biparental care. Smith's Longspur *Calcarius picta*, however, is unusual among songbirds for having a polygynandrous mating system. In this system, males mate with multiple females and females mate with multiple males (usually 2 or 3), and both may copulate 350 times over the course of the week, one of the highest rates in all birds. As a result, most nests of this species contain nestlings sired by multiple males, all of which assist females in raising young. Nests of longspurs and *Plectrophenax* buntings are simple open cups built by the female of grass and sedges and lined with hair and feathers. These nests are often well concealed, often under dense clumps of grass or sedge, or near bushes or large rocks. Snow Buntings *Plectrophenax nivalis* take extra precautions in hiding their nests, placing them deep



Snow Bunting, *Plectrophenax nivalis*. Plymouth Beach, Massachusetts, USA. © Ian Davies.

in cracks and fissures in rock. Female calcariids typically lay 1 to 8 eggs (usually 3 to 6). Females alone incubate, with males feeding incubating females in especially harsh Arctic conditions. Incubation generally takes 10 to 13 days. Both male and female help care for the young, and the chicks leave the nest after 7 to 14 days, able only to run in the grass the first few days.

**Conservation** Habitat loss is the primary threat facing calcariids, and it has put one species (17%) at risk (1 NT). The Chestnut-collared Longspur *Calcarius ornatus*, which breeds and winters on the Great Plains of North America, has undergone serious population declines with the conversion of grazed grasslands to croplands.

**Relationships** Calcariidae is part of the large and diverse superfamily Passeroidea, and is often included in the diverse radiation of nine-primaried New World oscines. Though the family had long been placed with Emberizidae *sensu lato*, recent genetic studies show that the longspurs and snow buntings are only distantly related to emberizids (Alström *et al.* 2008), and they have thus been placed in their own family. Calcariidae is likely sister to the rest of the New World nine-primaried oscines (Ericson & Johansson 2003, Klicka *et al.* 2003, Barker *et al.* 2013).



Smith's Longspur, *Calcarius pictus*. Galbraith Lake area, North Slope, Alaska, USA. © Ian Davies.

*CALCARIUS*
3 species



*C. lapponicus*
Lapland Longspur

*RHYNCHOPHANES*
1 species



*R. mccownii*
McCown's Longspur

*PLECTROPHENAX*
2 species



*P. nivalis*
Snow Bunting

Passeriformes, Passeroid Oscines

# RHODINOCICHLIDAE
## Thrush-tanager

1 genus · 1 species

**Related Families** The other 13 families in the New World nine-primaried oscines excluding Calcariidae

**Similar Birds** Tanagers (Thraupidae), thrushes (Turdidae), thrashers (Mimidae), ovenbirds (Furnariidae)

**Description**
- Plumage with slaty-brown body and white supercilium; brilliant rosy-red or yellow-orange below
- Wings medium-short; tail medium-long, rounded
- Body medium-sized, cylindrical ovoid
- Bill medium-long, very slightly decurved, with a slight terminal hook
- Head medium-small; neck medium
- Legs and feet medium-sized
- Males more brightly colored than females

**Habitat** The Thrush-tanager lives in wet or dry thickets and scrub, including woodlands, second growth, edge, and plantations. Altitude ranges are different in the different subspecies, and they may prefer thorn forest in Mexico and canebrakes in Costa Rica.

**Food** *Rhodinocichla* feeds on insects and other invertebrates as well as seeds and fruit. Birds forage primarily on the ground, using their bills to toss leaves aside in search of food, often with a concerted search in a single area. Very shy, these birds seldom emerge from the undergrowth.

**Breeding** The Thrush-tanager is monogamous with biparental care. Both members of the pair construct an open cup nest of twigs, lined with finer material and leaves, that is placed low in a dense shrub. Some nests may be built on a platform of sticks. Females lay 2 or 3 eggs. Both the male and female are active in nest construction, incubation, and in feeding the chicks. No information, apparently, is available on developmental periods of the young.

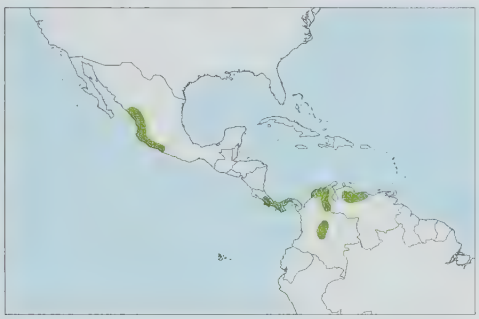


Thrush-tanager, *Rhodinocichla rosea*.
El Tuito, Jalisco, Mexico. © Joe Fuhrman / VIREO.

**Conservation** The Thrush-tanager faces no immediate conservation concerns.

**Relationships** The Thrush-tanager is part of the New World radiation of nine-primaried oscines within the superfamily Passeroidea. The taxonomic position of the Thrush-tanager was long enigmatic, being alternately placed in Thraupidae, Furnariidae, Parulidae, Troglodytidae, and Mimidae. An early molecular study (Seutin & Bermingham 1997) clearly placed *Rhodinocichla* outside Mimidae and within the nine-primaried oscine radiation, and the most recent and complete study that includes this taxon indicated that it is the sole living representative of an old lineage that is well outside Thraupidae and Emberizidae and sister to them and all the rest of the New World nine-primaried oscines, excluding Calcariidae (Barker *et al.* 2013).





Few common names do as serviceable a job as this one. This seeming cross between the two birds is suggested not only by its morphology but also by its song, which incorporates the simple structure of many tanager songs and the ringing whistled quality of many thrush songs. The male Thrush-tanager *Rhodinocichla rosea* is an intense rose-pink below, and the female is a rich yellow-orange. Both sexes sing, and they duet to each other through dense thickets in scattered localities across Latin America. The five disjunct populations have each been given a separate subspecies name, and the divergence among these is quite possibly sufficient for them to merit full species status. Thus, this may not remain a monotypic family for long.



Thrush-tanager, *Rhodinocichla rosea*. El Valle, Panama. © Doug Wechsler / VIREO.

*RHODINOCICHLA*
1 species



*R. rosea*
Thrush-tanager

# EMBERIZIDAE
## Old World Buntings

5 genera • 42 species

**Related Families** The other 12 families in the New World nine-primaried oscines excluding Calcariidae and Rhodinocichlidae

**Similar Birds** Longspurs (Calcariidae), sparrows (Passerellidae and Passeridae), New World buntings (Cardinalidae)

**Description**
- Plumage generally streaked brown above, with contrasting patches of gray, black, white, rufous, or yellow around face and underparts
- Wings short to medium, rounded to pointed; tail medium-long
- Body small, ovoid, compact
- Bill short to medium, conical, slightly inflated, sharp-tipped
- Head small; neck short
- Legs short; feet medium-sized
- Males often more brightly colored and boldly patterned than females

**Habitat** Old World buntings live in a wide variety of open habitats, including grassland, marsh, shrubland, savanna, barren ground, and forest edges.

**Food** The diets of emberizids are diverse, with a focus on invertebrates during the breeding season. Insect abundance is particularly important for feeding chicks, and decreases in invertebrate populations have been implicated in population declines in some buntings. During the non-breeding season, and in wet weather during the breeding season, the Old World buntings feed primarily on seeds and grain, and most species usually feed on the ground.

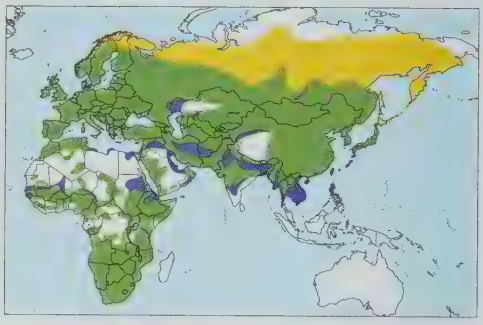
**Breeding** Emberizids are generally monogamous with biparental care. Females typically construct an open cup nest of twigs, grasses, and other vegetation, often lined with finer grasses, rootlets, and sometimes animal hair or fur, placed on or near the ground, well concealed by vegetation. Females lay 2 to 6 eggs, with clutch size generally increasing with latitude. Typically, only the female incubates, though males will occasionally incubate for short periods. Incubation takes 11 to 15 days. Chicks are provisioned by both parents or by the female alone. Chicks leave the nest after 8 to 13 days, often not able to fly until a few days after leaving the nest, and they are cared for by the parents for up to about three weeks after fledging.

**Conservation** Habitat loss and direct harvesting are the primary threats facing emberizids, seven species of which (17%) are of conservation concern (3 NT, 2 VU, 2 EN). The endangered Rufous-backed (Jankowski's) Bunting *Emberiza jankowskii* is a dry-grassland species whose range has shrunk to only a handful of sites in China, where the known population of perhaps 100



Tibetan Bunting, *Emberiza koslowi*. Kandashan Pass, Qinghai, China. © Dubi Shapiro.





The Old World buntings are a widespread group of small songbirds generally endowed with modest plumages, aside from a handful with bright-yellow wash on the breast or head. They, like many unrelated birds known as "sparrows," are clothed to fit their open-country landscapes, primarily in earth tones, with contrasting bars or splashes of black around the face. It is their distinctive songs that announce their presence and their identity. After breeding, they molt into even drabber plumage, ratcheting up the challenge of species identification. As with many seed-eating species of open terrain, they tend to switch during the breeding season to a higher-protein diet rich with insects, especially for feeding their young.



Golden-breasted Bunting, *Fringillaria flaviventris*. Kruger NP, South Africa. © Dubi Shapiro.

birds is threatened by changing fire regimes and the encroachment of agriculture, even in reserves. The endangered Yellow-breasted Bunting *E. aureola*, a wetland-associated migrant bird that once bred all across Eurasia, is in similar straits; its populations are declining range-wide, most likely from pressures on its wintering grounds, especially widespread conversion of its reed-bed habitat to agriculture and, in China, widespread trapping of the birds, mostly for human food. The vulnerable Japanese Yellow Bunting *E. sulphurata*, which breeds in a restricted range in the mountains of central Japan, faces similar threats in winter. And the vulnerable Socotra Bunting *Fringillaria socotrana* has a tiny global range, patchily distributed in hill grass and scrub on a single island in the Indian Ocean off the Horn of Africa, where increased domestic grazing and introduced mammalian predators are a constant threat.

**Relationships** Emberizidae is part of the New World radiation of nine-primaried oscines within the large superfamily Passeroidea. The taxonomy of Emberizidae has had a complicated history, and has at one time included the members of several families within the New World nine-primaried oscine radiation. Most notably, the New World sparrows (Passerellidae) were long considered part of Emberizidae, but molecular phylogenetic work has shown that the these two groups constitute two distinct radiations (Yuri & Mindell 2002, Klicka *et al.* 2003, Alström *et al.* 2008, Barker *et al.* 2013). Emberizidae seems most likely to be sister to the radiation of New World nine-primaried oscines, excluding Calcariidae and Rhodinocichlidae (Barker *et al.* 2013).



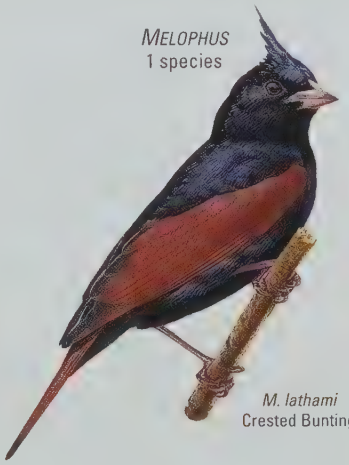
Corn Bunting, *Emberiza calandra*. Lubelszczyzna, Poland. © Paweł Wacławik.

*FRINGILLARIA*
10 species



*F. socotrana*
Socotra Bunting

*MELOPHUS*
1 species



*M. lathami*
Crested Bunting

*GRANATIVORA*
2 species



*G. melanocephala*
Black-headed Bunting

*EMBERIZA*
15 species



*E. cia*
Rock Bunting

*SCHOENICLUS*
14 species



*S. aureolus*
Yellow-breasted Bunting

# PASSERELLIDAE
## New World Sparrows

30 genera • 134 species

**Related Families** Parulidae (New World warblers), Icteridae (New World blackbirds) Zeledoniidae (Wren-thrush), Teretistridae (Cuban warblers), Cardinalidae (cardinals), Thraupidae (tanagers), plus five Central American tanager families

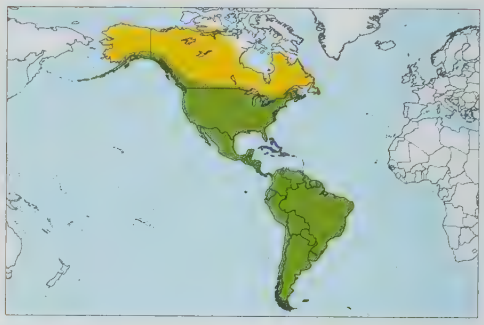
**Similar Birds** Old World buntings (Emberizidae), longspurs (Calcariidae), Old World sparrows (Passeridae), many South American seed-eating birds (Thraupidae)

**Description**
- Plumage dominated by browns, white, black, olive, and yellows; some species very boldly patterned but most quite cryptic
- Wings medium-long, rounded; tail short to medium-long
- Body small to medium, cylindrical ovoid, compact
- Bill conical, mostly short
- Head medium to large; neck thick to medium
- Legs medium-long; feet medium to large
- Sexes generally similar



Black-throated Sparrow, *Amphispiza bilineata*. Near Riverside, California, USA. © Mark A. Chappell.





**Habitat** The New World sparrows live in a broad array of terrestrial habitats, from boreal muskeg to lowland rainforest, marsh to grassland, desert scrub to tundra, and savanna.

**Food** Passerellids in temperate regions feed on a variety of invertebrates, fruit, and seeds, the last especially during the non-breeding season, and the relative proportions of seeds/fruit vs. insects vary greatly among species. Very few data are available on the food preferences of tropical species, but their diets are presumed to be similar in composition to those of temperate species.

**Breeding** The New World sparrows are generally monogamous with biparental care, but polygynous or promiscuous in some marsh-breeding species. Most species construct open cup nests using grass, twigs, and other such materials. Nests are placed in trees and shrubs or on the ground. Some species, including Bachman's Sparrow *Peucaea aestivalis* and those in the genus *Arremon*, construct domed nests. Female sparrows typically lay 1 to 7 eggs. In most New World Sparrows, the females construct all or most of the nest and do all of the incubation. Both male and female are active in feeding the young and in defending the nest from predators and rivals. Incubation takes 12 to 15 days, and the nestling period about 7 to 15 days.

Passerellids, unlike the quite distantly related open-country inhabitants of the Old World also known as sparrows, are quite catholic in their choice of landscapes. Denizens of Arctic barrens, desert scrub, and tropical rainforest, among other habitats, passerellids are also more variable in size, becoming larger as one moves south into Central and South America. Plumages also tend to follow a latitudinal gradient: starting with the brown, streaked, head-patterned sparrows of the north, these songbirds of the undergrowth generally become less streaky and pick up large patches of contrasting olives, grays, black, and reddish-browns moving southward. Despite these aspects of diversity, the family's mating habits are quite uniform, with monogamy being surprisingly common.



Grasshopper Sparrow, *Ammodramus savannarum*. Crane Wildlife Management Area, Massachusetts, USA. © Ian Davies.

Post-fledging parental care usually lasts at most a month.

**Conservation** Habitat loss threatens 18 species of passerellids (13%), mostly from Mexico south to South America (7 NT, 4 VU, 6 EN, 1 CR). The critically endangered Antioquia Brush-finch *Atlapetes blancae* is known only from three museum specimens taken from Colombia as late as 1971. Expeditions to the type locality in 2007 and 2008 failed to find the species, and the forest habitat there has been converted into cattle ranch and commercial flower farms. Other endangered passerellids include three more species in the same genus, all occupying very tiny ranges in the Andes. Despite the tiny estimated range (1 km$^2$) of the Pale-headed Brushfinch *A. pallidiceps*, its population has grown as a result of intensive management and control of cowbirds. However, decreased habitat availability, much from "improvement" of shrublands for agriculture, plagues both the Yellow-headed Brushfinch *A. flaviceps* and Black-spectacled Brush-finch *A. melanopsis*. The endangered Zapata Sparrow *Torreornis inexpectata* is restricted to three wetland remnants in Cuba, all of which are under pressure for agricultural or tourist development. Two other endangered species with restricted ranges include the Sierra Madre Sparrow *Xenospiza baileyi* and Worthen's Sparrow *Spizella wortheni*. Both are restricted to tiny grassland and shrubland ranges in the mountains of Mexico, where conversion of habitat to agriculture is an ongoing threat.

**Relationships** Passerellidae is part of the large radiation of New World nine-primaried oscines, which are within the superfamily Passeroidea. The New World sparrows have traditionally been placed in a larger Emberizidae *sensu lato*, but molecular phylogenetic studies have shown that these two groups are distinct clades (Yuri & Mindell 2002, Klicka *et al.* 2003, Alström *et al.* 2008, Barker *et al.* 2013). Within the New World nine-primaried oscines, Passerellidae is likely sister to the clade that includes Parulidae, Icteridae, and several low-diversity families endemic to the Caribbean (Barker *et al.* 2013). Within Passerellidae, *Chlorospingus*, long considered to be in Thraupidae, is actually embedded deep within the family (DaCosta *et al.* 2009, Barker *et al.* 2013, Klicka *et al.* 2014).

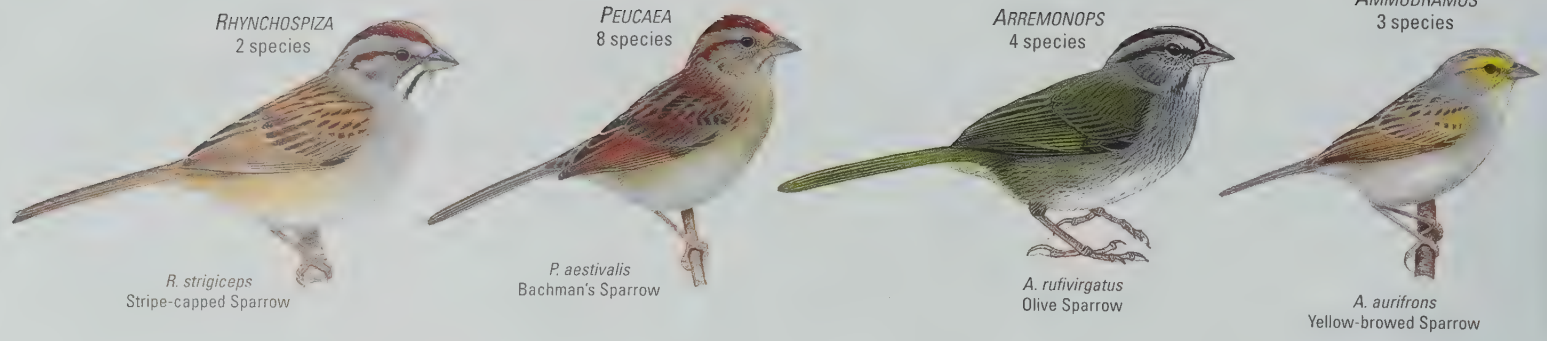


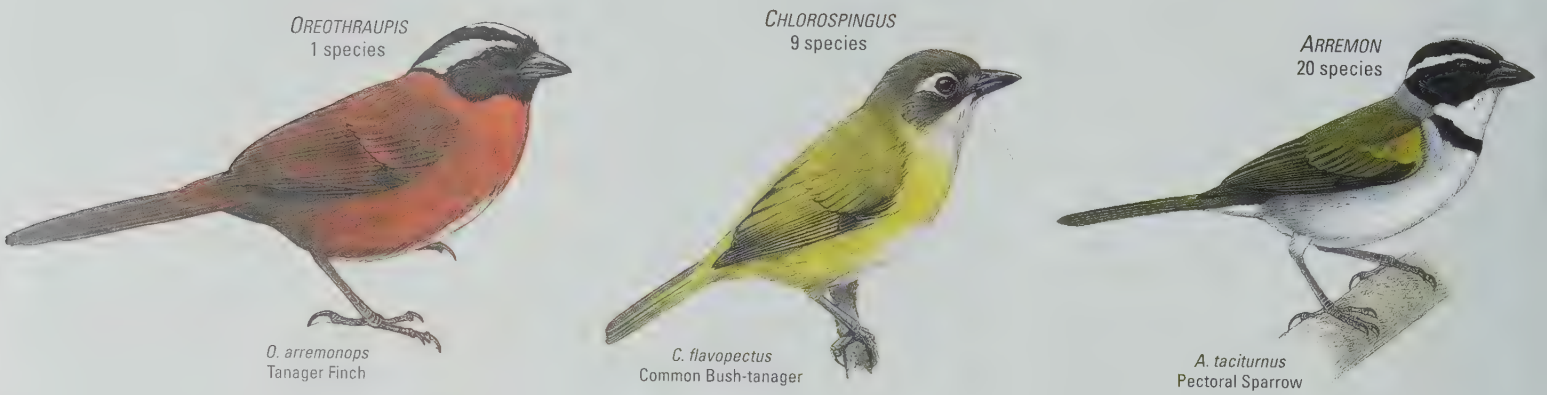
Swamp Sparrow, *Melospiza georgiana*. Honey Pot, Hadley, Massachusetts, USA. © Ian Davies.



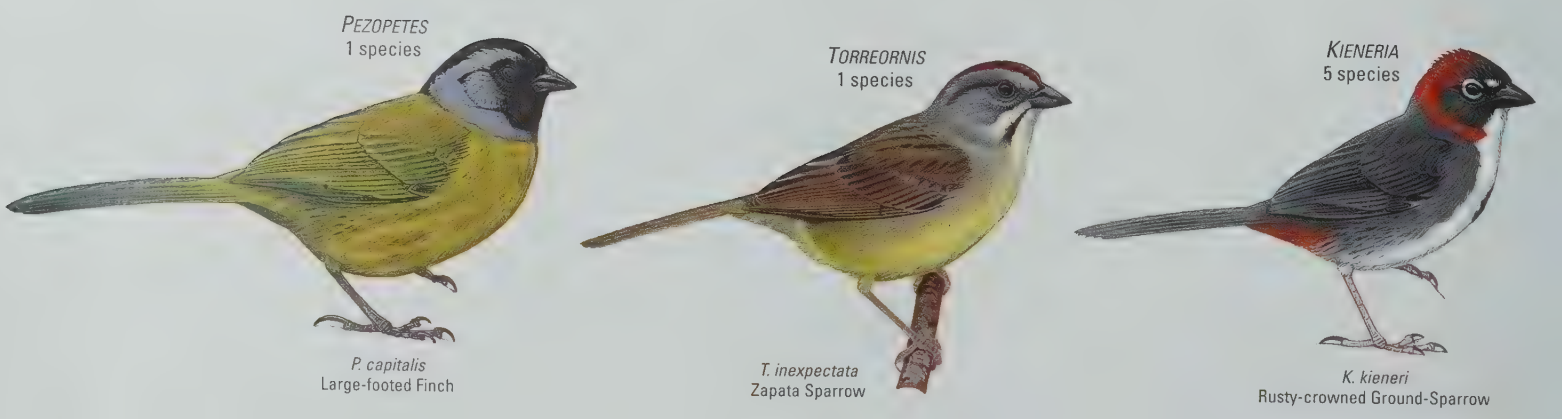
Fulvous-headed Brush Finch, *Atlapetes fulviceps*. Yala, Jujuy, Argentina. © Ian Davies.




RHYNCHOSPIZA
2 species
R. strigiceps
Stripe-capped Sparrow
PEUCAEA
8 species
P. aestivalis
Bachman's Sparrow
ARREMONOPS
4 species
A. rufivirgatus
Olive Sparrow
AMMODRAMUS
3 species
A. aurifrons
Yellow-browed Sparrow


OREOTHRAUPIS
1 species
O. arremonops
Tanager Finch
CHLOROSPINGUS
9 species
C. flavopectus
Common Bush-tanager
ARREMON
20 species
A. taciturnus
Pectoral Sparrow


PIPILO
4 species
P. maculatus
Spotted Towhee
PSELLIOPHORUS
2 species
P. tibialis
Yellow-thighed Finch
ATLAPETES
28 species
A. latinuchus
Yellow-breasted Brush-finch

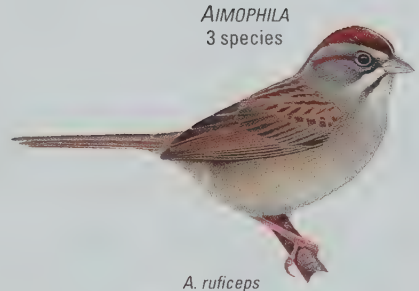

PEZOPETES
1 species
P. capitalis
Large-footed Finch
TORREORNIS
1 species
T. inexpectata
Zapata Sparrow
KIENERIA
5 species
K. kieneri
Rusty-crowned Ground-Sparrow

*Melozone*
2 species



*M. leucotis*
White-eared Ground-Sparrow

*Aimophila*
3 species



*A. ruficeps*
Rufous-crowned Sparrow

*Junco*
3 species



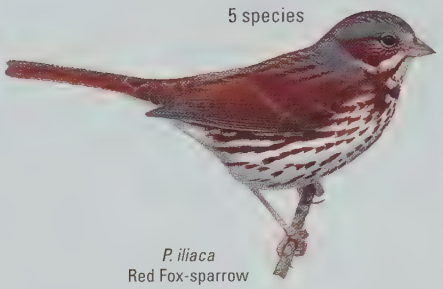
*J. hyemalis*
Dark-eyed Junco

*Zonotrichia*
5 species



*Z. capensis*
Rufous-collared Sparrow

*Passerella*
5 species



*P. iliaca*
Red Fox-sparrow

*Ammospiza*
4 species



*A. maritima*
Seaside Sparrow

*Artemisiospiza*
2 species



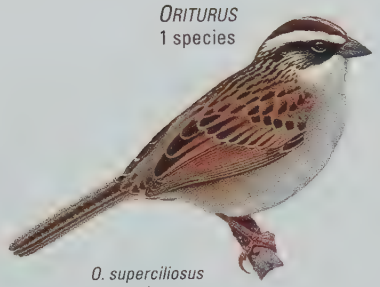
*A. nevadensis*
Sage Sparrow

*Pooecetes*
1 species



*P. gramineus*
Vesper Sparrow

*Oriturus*
1 species



*O. superciliosus*
Striped Sparrow

*Passerculus*
4 species



*P. sandwichensis*
Savannah Sparrow

*Centronyx*
2 species



*C. henslowii*
Henslow's Sparrow

*Xenospiza*
1 species



*X. baileyi*
Sierra Madre Sparrow

*Melospiza*
3 species



*M. georgiana*
Swamp Sparrow

# ZELEDONIIDAE
## Wren-thrush

1 genus · 1 species

**Related Families** Teretistridae (Cuban warblers), Icteridae (New World blackbirds), Parulidae (New World warblers)

**Similar Birds** Warblers (Parulidae, Sylviidae, Phylloscopidae), wrens (Troglodytidae), babblers (Pellorneidae, Timaliidae, Leiothrichidae)

**Description**
- Plumage mostly slate gray with a distinct rusty crown
- Wings short, rounded; tail short
- Body small, cylindrical ovoid, compact
- Bill short, thin
- Head large; neck short, thick
- Legs and feet medium length
- Sexes similar

**Habitat** The Wren-thrush *Zeledonia coronata* lives in dense bamboo thickets or in dense second growth in the páramo, above treeline.

**Food** *Zeledonia* feeds mainly on insects and other invertebrates, foraging primarily on the ground.

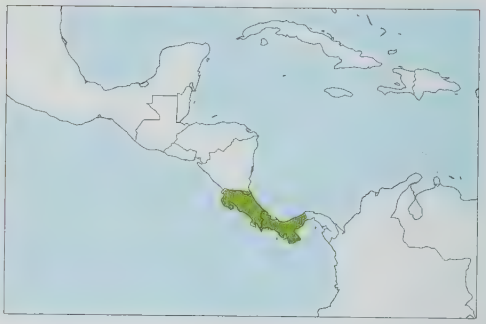
**Breeding** Very little is known about the breeding biology of the Wren-thrush; however, it is presumed to be monogamous with biparental care. Wren-thrush nests are balls of moss with an entrance on the side, and are most often placed on the ground. Females typically lay 2 or 3 eggs. Little is known of parental care or the rate of development of the young.

**Conservation** The Wren-thrush does not currently face any conservation concerns.



Wren-thrush, *Zeledonia coronata*.
Cerro de la Muerte, Costa Rica. © Nick Athanas.





**Relationships** *Zeledonia* is part of the New World nine-primaried oscine radiation. Although it has long been considered part of Parulidae, recent molecular phylogenetic work shows that this species does not have its closest affinities within that family (Lovette *et al.* 2010), and it seems most likely to be sister to Teretistridae (Barker *et al.* 2013). We choose to keep these two clades separate and not merge them into a single family because they are not always recovered as sister taxa (e.g., Klicka *et al.* 2007). Nevertheless, these two families together appear most likely to be sister to the clade made up of Parulidae with Icteridae (Barker *et al.* 2013).

This family consists solely of a secretive skulker of cloud-forest thickets in the mountains of Costa Rica and Panama, about which very little is known. Its fiery crown is reminiscent of a kinglet's, as are its simple few-note sibilant calls. It forages furtively in the low branches of shrubbery, recalling a stealthy wren, and it is hard to localize in the dense misty habitats that it haunts. Future work could probably tell us much about this species' life history, especially regarding its breeding biology.



Wren-thrush, *Zeledonia coronata*. Poás Volcano, Costa Rica. © Tom Johnson.

*ZELEDONIA*
1 species



*Z. coronata*
Wren-thrush

Passeriformes, Passeroid Oscines

# TERETISTRIDAE
## Cuban Warblers

1 genus • 2 species

**Related Families** Zeledoniidae (Wren-thrush), Icteridae (New World blackbirds), Parulidae (New World warblers)

**Similar Birds** Warblers (Parulidae, Sylviidae, Phylloscopidae), vireos (Vireonidae), Yellowhead (Mohouidae)

**Description**
- Plumage gray with yellow in head and breast
- Wings medium-short, rounded; tail medium length
- Body small, cylindrical ovoid
- Bill medium in length and depth, very slightly decurved
- Head medium-sized; neck short, thick
- Legs medium-short; feet medium
- Sexes similar

**Habitat** The two species of *Teretistris* live in terrestrial habitats with undisturbed understory, from scrub thickets in arid areas to more mesic forests, ranging from the coast to the hills.

**Food** The Cuban warblers feed mainly on insects and other invertebrates, gleaning, and sometimes hover-gleaning, prey from mid to low levels in the forest, often working from shrubbery onto the ground to forage in the afternoons. Both species are known to take small lizards, as well as some fruit. Outside the breeding season, they are generally in flocks of a handful to 15 or so individuals, often serving as the nucleus for mixed-species flocks.

**Breeding** Very little is known about the breeding behavior of this family; however, it is presumed that both species are monogamous with biparental care. Nests of the *Teretistris* species consist of simple cups constructed of *Tillandsia* leaves, rootlets, grasses, and other plants that are placed low in a shrub, often hidden in a clump of *Tillandsia*. Females lay 2 or 3 eggs. Little is known about sex roles in parental care, but incubation takes 8 to 9 days and the nestling period lasts 10 to 11 days.

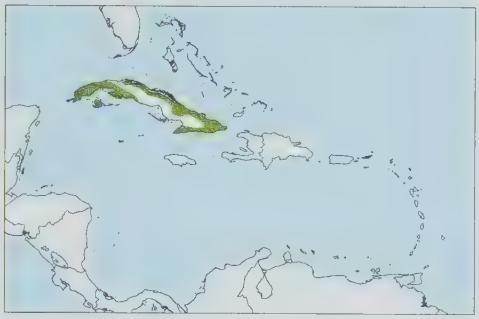


Yellow-headed Warbler, *Teretistris fernandinae*. Las Terrazas, Cuba. © Adam Riley / Rockjumper Birding Tours.

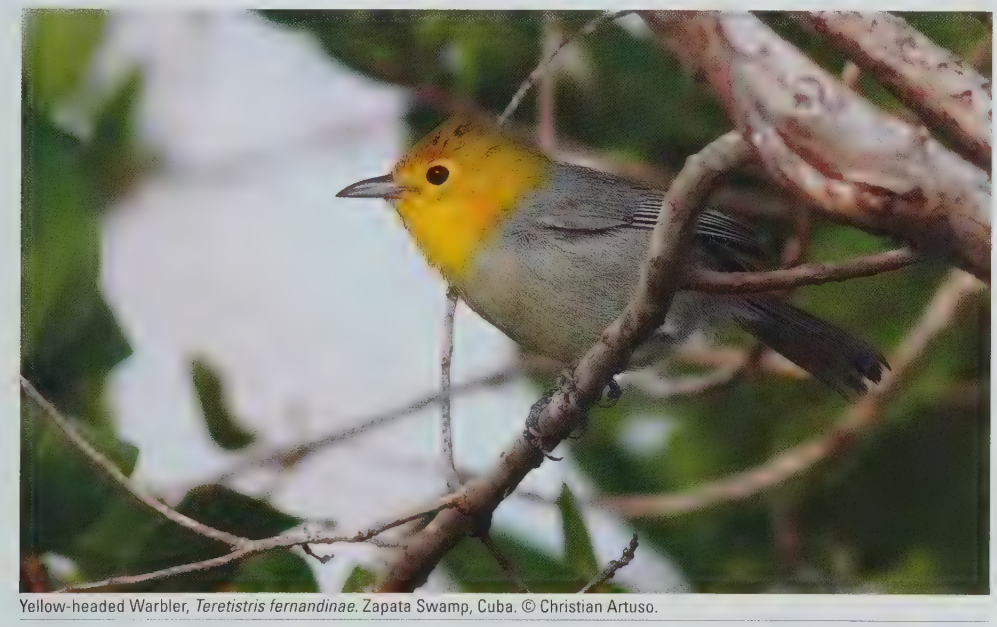
**Conservation** Neither *Teretistris* species faces any immediate conservation concerns.

**Relationships** Teretistridae is part of the New World nine-primaried oscine radiation within the superfamily Passeroidea. Along with Zeledoniidae, *Teretistris* had long been considered part of Parulidae, but recent studies have found that *Teretistris* is not included in the New World warbler radiation (Lovette *et al.* 2010). Relatively few molecular studies have included *Teretistris* in their samples, but the first study to do so (Klicka *et al.* 2007) found *Teretistris* to be sister to Spindalidae and the clade of these two together to be sister to a clade made up of Parulidae and *Icteria* together with *Zeledonia*. A more recent, more detailed study found Teretistridae to be sister to Zeledoniidae, with this clade of two in turn sister to Parulidae and Icteridae (Barker *et al.* 2013).





This family contains two assertive yellow and gray warblers endemic to Cuba, the Yellow-headed and Oriente Warblers (*Teretistris fernandinae* and *T. fornsi*, respectively). Both are busy foragers, gleaning prey from thick undergrowth and down on the ground. During the breeding season their simple trilled songs, interspersed sometimes with wren-like chatterings, have the character of one of the drier, more insect-like songs of warblers. In the non-breeding season, these birds are usually encountered in flocks, often accompanied by other species as they move through the shrubbery looking for food.



Yellow-headed Warbler, *Teretistris fernandinae*. Zapata Swamp, Cuba. © Christian Artuso.

*TERETISTRIS*
2 species



*T. fornsii*
Oriente Warbler

# ICTERIDAE
## New World Blackbirds

31 genera • 112 species

**Related Families** Parulidae (New World warblers), Zeledoniidae (Wren-thrush), Teretistridae (Cuban warblers), Phaenicophilidae, Nesospingidae, Spindalidae, Emberizidae

**Similar Birds** Old World orioles (Oriolidae), starlings (Sturnidae), crows and jays (Corvidae)

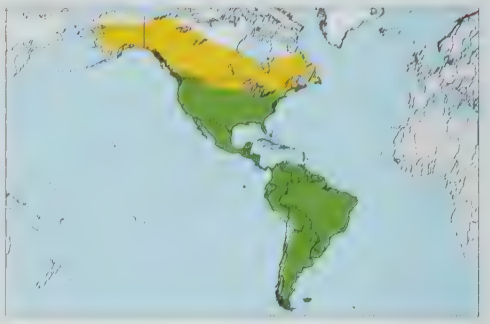
**Description**

- Plumages generally brown or black with contrasting patches in red, yellow, orange, or reddish brown
- Wings medium length, pointed; tail short to long
- Body medium-small to large, cylindrical ovoid
- Bill sharply pointed, thin, and medium-long to deep and medium-short
- Head medium-sized; neck medium to medium-long
- Legs medium-short; feet medium
- Males usually larger and more brightly colored and boldly patterned than females



Rusty Blackbird, *Euphagus carolinus*. Prud'homme, Saskatchewan, Canada. © Nick Saunders.





**Habitat** Icterids live in a wide variety of habitats, ranging from boreal forest and bogs at the northern limits of their range to tropical rainforest, grasslands, arid shrubland, savanna, and marshes.

**Food** The New World blackbirds and their allies feed on a broad range of items, including insects and other invertebrates, small vertebrates (including nestlings of other birds), fruit, and nectar. Some species, such as the cowbirds, also feed on seeds and other grain. *Icterus* orioles, *Cacicus* caciques, and *Psarocolius* oropendolas feed heavily on fruits and nectar, in addition to insects and other invertebrates.

**Breeding** Most species of icterids appear to be socially monogamous, and quite a few are polygynous, most serially so. Many are colonial breeders, and cooperative breeding occurs in a few species. The icterids include a single clade of obligate brood parasites, the cowbirds, different species of which parasitize anywhere from one or two species to over a hundred. Two primary types of nests are constructed by the icterids: a typical open cup nest or the alternative— constructed by the caciques, oropendolas, and orioles—a long, pendulous basket woven of grass or other fibers. In species that build cup nests, nests may be placed in trees, bushes, reeds, or on the ground. Ground-nesting *Sturnella* meadowlarks construct an arch over the nest to protect the eggs and nestlings. Icterids typically lay 2 to 7 eggs, with tropical species laying smaller clutches. In most icterid species, only the female is responsible for nest construction and incubation. In many species, especially those that are polygynous, the female is entirely responsible for feeding the young as well. However, in other species, males may also help with feeding young. In the cowbirds, the chicks are cared for entirely by the host parents. Incubation generally takes 11 to 15 days, and up to 20 days in the larger oropendolas; cowbird

From small orioles to the mighty oropendolas, this family spans a broad variation in body size, nesting ecology, and mating systems. Across this broad range, a remarkable number of species share distinctive liquid whistle notes in their songs. Some oropendolas have the greatest sexual size dimorphism of any passerine and an aggression-based harem mating system to match. The Bobolink is one of the longest-distance songbird migrants from North America, flying out over the Atlantic from the northeastern United States in fall to its wintering grounds in southern South America. As in a few other groups, these blackbirds have a well-developed ability to open their sharp-tipped bills strongly, allowing them to stab and gape to pry off bark or open up soft fruits.



Altamira Oriole, *Icterus gularis*. Puerto Aventuras, Quintana Roo, Mexico. © Ian Davies.

eggs generally hatch after only 10 to 12 days of incubation by their host. Chicks of most icterid species leave the nest after 10 to 14 days, but chicks of the larger species can remain in the nest for up to 35 days.

**Conservation** Habitat loss is the primary threat facing icterids, 15 species of which (13%) are of conservation concern (1 NT, 4 VU, 8 EN, 2 CR). Many of the endangered icterid species occur in South America. In the northern Andes of Colombia, the Colombian Mountain Grackle *Macroagelaius subalaris* is limited to a few patches of remnant oak forest in the east, and the Red-bellied Grackle *Hypopyrrhus pyrohypogaster* has been captured for the cage-bird trade and persecuted as a crop pest in addition to having had its montane forest habitat reduced to a few small remnants. The Baudo Oropendola *Psarocolius cassini* from the Darien of Colombia has a very tiny range, as does the Selva Cacique *Cacicus koepckeae* in the Amazonian lowlands of Peru. With both species, there are hopes that poorly surveyed pristine areas nearby may harbor other populations of these birds. On the other side of the continent, in the beleaguered Atlantic Coast forest of Brazil, Forbes's Blackbird *Curaeus forbesi* is known from only two widely separated areas, where it is threatened by expanding cowbird parasitism and capturing for the cage-bird trade. The two critically endangered icterids are both orioles from the Caribbean. The Bahama Oriole *Icterus northropi* is limited to very few islands in the archipelago, where it is besieged by a disease killing the palms on which it relies and by parasitism by newly arrived cowbirds. And the Montserrat Oriole *Icterus oberi* is threatened by habitat loss resulting from recent volcanic eruptions on the one tiny island it occupies. Other endangered icterids in the region include the Jamaican Blackbird *Nesopsar nigerrimus*, limited to native mountain forest on that island, and the Yellow-shouldered Blackbird *Agelaius xanthomus*, limited to coastal mangroves on Puerto Rico and one offshore islet. Populations of this species are gradually being restored by intensive control of introduced predators and cowbirds and by habitat management. In North America, the endangered Tricolored Blackbird *Agelaius tricolor* is limited to the Central Valley of California where natural marsh for nesting has been severely restricted by pervasive agricultural and housing development. And in the Valley of Mexico and the Toluca Valley, the marsh-nesting Slender-billed Grackle *Quiscalus palustris* went extinct in the early 20th century as the megalopolis of Mexico City began to develop.

**Relationships** Icteridae is part of the New World nine-primaried oscine radiation of the superfamily Passeroidea. Diverse molecular phylogenetic studies indicate that, within this radiation, Icteridae is either sister to Parulidae (Barker *et al.* 2013, Ericson & Johansson 2003) or sister to a larger group of passeroids that includes Parulidae (Lovette & Bermingham 2002, Yuri & Mindell 2002, Alström *et al.* 2008). Within Icteridae, we recognize two subfamilies, Icteriinae and Icterinae. Although the Yellow-breasted Chat is sometimes placed in a separate family, we choose to place it within Icteridae as the sole species in the subfamily Icteriinae, which most analyses in Barker *et al.* (2013) suggest is sister to the rest of Icteridae.



Chestnut-headed Oropendola, *Psarocolius wagleri*. Muñeco, Altos de Orosi de Cartago, Costa Rica. © Alex Vargas.



Boat-tailed Grackle, *Quiscalus major*. Key Biscayne, Florida, USA. © Ramón Casares.



Yellow-headed Blackbird, *Xanthocephalus xanthocephalus*. Kidder County, North Dakota, USA. © Christopher L. Wood.

*ICTERIA*
1 species



*I. virens*
Yellow-breasted Chat

*XANTHOCEPHALUS*
1 species



*X. xanthocephalus*
Yellow-headed Blackbird

*DOLICHONYX*
1 species



*D. oryzivorus*
Bobolink

*STURNELLA*
3 species



*S. magna*
Eastern Meadowlark

*LEISTES*
5 species



*L. superciliaris*
White-browed Blackbird

*AMBLYCERCUS*
1 species



*A. holosericeus*
Yellow-billed Cacique

*CASSICULUS*
1 species



*C. melanicterus*
Yellow-winged Cacique

*PSAROCOLIUS*
10 species



*P. montezuma*
Montezuma Oropendola

*PROCACICUS*
1 species



*P. solitarius*
Solitary Cacique

*CACICUS*
11 species



*C. cela*
Yellow-rumped Cacique

*ICTERUS*
34 species



*I. galbula*
Baltimore Oriole

*NESOPSAR*
1 species



*N. nigerrimus*
Jamaican Blackbird

*AGELAIUS*
5 species



*A. phoeniceus*
Red-winged Blackbird

*MOLOTHRUS*
6 species



*M. bonariensis*
Shiny Cowbird

*DIVES*
2 species



*D. dives*
Melodious Blackbird

*PTILOXENA*
1 species



*P. atroviolacea*
Cuban Blackbird


EUPHAGUS
2 species
E. carolinus
Rusty Blackbird
QUISCALUS
6 species
Q. quiscula
Common Grackle
HYPOPYRRHUS
1 species
H. pyrohypogaster
Red-bellied Grackle
LAMPROPSAR
1 species
L. tanagrinus
Velvet-fronted Grackle
GYMNOMYSTAX
1 species
G. mexicanus
Oriole Blackbird
MACROAGELAIUS
2 species
M. subalaris
Colombian Mountain Grackle
CURAEUS
2 species
C. curaeus
Austral Blackbird
AMBLYRAMPHUS
1 species
A. holosericeus
Scarlet-headed Blackbird
GNORIMOPSAR
1 species
G. chopi
Chopi Blackbird
OREOPSAR
1 species
O. bolivianus
Bolivian Blackbird
AGELAIOIDES
2 species
A. fringillarius
Pale Baywing
AGELASTICUS
3 species
A. thilius
Yellow-winged Blackbird
CHRYSOMUS
2 species
C. icterocephalus
Yellow-hooded Blackbird
XANTHOPSAR
1 species
X. flavus
Saffron-cowled Blackbird
PSEUDOLEISTES
2 species
P. guirahuro
Yellow-rumped Marshbird

# PARULIDAE
## New World Warblers

18 genera • 108 species

**Related Families** Icteridae (New World blackbirds), Teretistridae (Cuban warblers), Zeledoniidae (Wren-thrush)

**Similar Birds** Warblers (Phylloscopidae, Sylviidae, Cisticolidae, Acanthizidae, Teretistridae, Locustellidae, Scotocercidae), vireos (Vireonidae), white-eyes (Zosteropidae)

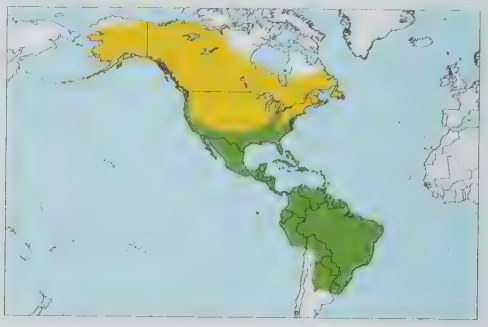
**Description**

- Plumage with large patches of yellow, blue-gray, black, white, and, less frequently, red or brown
- Wings medium-long; tail medium to medium-long
- Body small, cylindrical ovoid, compact
- Bill short to medium, slender, pointed in most
- Head medium-sized; neck medium in length and thickness
- Legs short to medium; feet small to medium
- Males often more brightly colored and boldly patterned than females



Red Warbler, *Cardellina ruber*.
La Cumbre, Oaxaca, Mexico. © Luke Seitz.





**Habitat** In temperate North America, New World warblers have diverse habitat preferences, from marshes, shrubland, and old-field habitats to mature deciduous and boreal forests. Although most are arboreal, some species spend much of their time on the ground. In the Neotropics, warblers generally live in tropical moist forests, ranging from lowland rainforest to high-elevation cloud forest.

**Food** Most New World Warblers feed primarily on insects and other small invertebrates, with occasional small fish for waterside species. Some species also feed heavily on fruit or nectar during the non-breeding season.

**Breeding** The New World warblers are socially monogamous with biparental care. Most species construct an open cup nest, which, in different species, may be placed anywhere from the ground to high in the canopy of tall trees. Many ground-nesting species build a domed nest with an entrance in the side, and there are two species that adopt tree holes for their nests. The two parulas (genus *Setophaga*) build their nests in a mass of moss or lichen. Females generally lay 2 to 7 eggs (with smaller clutches in tropical species and up to 9 eggs occasionally in northern species). Females generally construct the nest and incubate alone, and males often feed them during incubation. Incubation takes 11 to 17 days, on the small end of this range in the temperate species. Both male and female provision the young once hatched, and the young leave the nest after 8 to 15 days there; again, the nestling periods are on the shorter end of this

These warblers of the New World have similar ecologies to Old World birds of the same name. Nowhere else, however, do warblers sport the diversity and stunning beauty of the parulids. Though a good many are tropical residents, almost half are long-distance migrants that breed in North America and spend the winter in the tropics. Recent phylogenetic analyses show that parulids originated from northern migrants rather than from the tropics. The northern migrants are more brightly colored in summer than in the fall, and birdwatchers can struggle to separate the many somberly clad species during fall migratory stopovers. Studies of warblers from the northeastern United States have taught us much about community ecology and about the physiological and ecological implications of small-landbird migration.



Cerulean Warbler, *Setophaga cerulea*. Dauphin County, Pennsylvania. © Tom Johnson.

range for temperate species. Temperate species feed their young for up to a month after fledging, but the young of tropical species often stay together with their parents in family groups until the following breeding season.

**Conservation** Habitat loss threatens 24 species (22%) of parulids (9 NT, 7 VU, 6 EN, 2 CR). Two species, Bachman's Warbler *Vermivora bachmani* and Semper's Warbler *Leucopeza semperi*, have likely gone extinct in recent years, although both are officially listed as critically endangered. Bachman's Warbler bred in bottomland hardwood forests of the southeastern United States, and declined due to habitat loss, whereas Semper's Warbler was found only on St. Lucia in the Caribbean and likely suffered from predation by introduced mongooses. Of the endangered parulid species, all are range-restricted: Golden-cheeked Warbler *Setophaga chrysoparia* is limited to patches of scrubby oak-juniper woods in central Texas; Whistling Warbler *Catharopeza bishopi* is limited to mid-elevation primary rainforest on a single island in the Lesser Antilles; Belding's Yellowthroat *Geothlypis beldingi* and Black-polled Yellowthroat *G. speciosa* occur only in a few freshwater marshes in Baja California and the central Mexican highlands, respectively; and Gray-headed Warbler *Basileuterus griseiceps* and Yellow-faced Whitestart *Myioborus pariae* are restricted to a few different mountain sites in coastal Venezuela.

**Relationships** Parulidae is part of the New World nine-primaried oscine radiation of the superfamily Passeroidea. In an early study with good taxonomic sampling, Lovette and Bermingham (2002) found Parulidae to be sister to Spindalidae, and these two together to form a polytomy with Icteridae, Zeledoniidae, Teretistridae, Emberizidae, and Phaenicophilidae. Of three studies with fairly limited taxonomic sampling in the nine-primaried oscines, two (Ericson & Johansson 2003, Yuri & Mindell 2002) found Parulidae sister to Icteridae, and the third (Alström *et al.* 2008) found Parulidae sister to Calcariidae, with these two taken together being sister to Icteridae. The most recent well-sampled study (Barker *et al.* 2013) found Parulidae to be sister to Icteridae and these two families taken together to be sister to the clade formed of Teretistridae plus Zeledoniidae.



Yellow Warbler, *Setophaga petechia*. Fairbanks, Alaska, USA. © Mark A. Chappell.

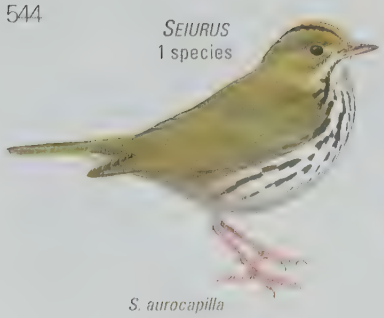


Brown-capped Whitestart, *Myioborus brunniceps*. Yala, Jujuy, Argentina. © Ian Davies.



Rufous-capped Warbler, *Basileuterus rufifrons*. Near Cerro Azul, Panama. © Mark A. Chappell.

*SEIURUS*
1 species



*S. aurocapilla*
Ovenbird

*HELMITHEROS*
1 species



*H. vermivorum*
Worm-eating Warbler

*PARKESIA*
2 species



*P. noveboracensis*
Northern Waterthrush

*VERMIVORA*
3 species



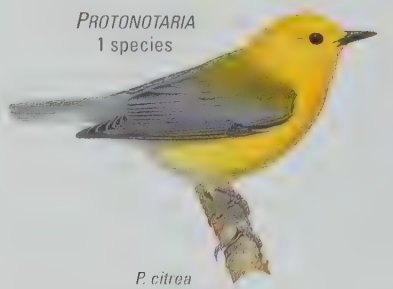
*V. chrysoptera*
Golden-winged Warbler

*MNIOTILTA*
1 species



*M. varia*
Black-and-white Warbler

*PROTONOTARIA*
1 species



*P. citrea*
Prothonotary Warbler

*LIMNOTHLYPIS*
1 species



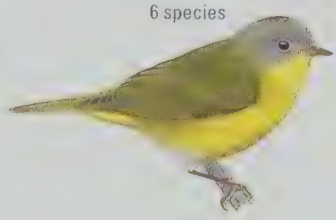
*L. swainsonii*
Swainson's Warbler

*OREOTHLYPIS*
2 species



*O. gutturalis*
Flame-throated Warbler

*LEIOTHLYPIS*
6 species



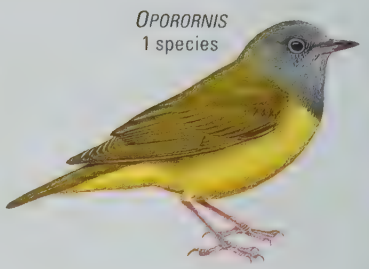
*L. ruficapilla*
Nashville Warbler

*LEUCOPEZA*
1 species



*L. semperi*
Semper's Warbler

*OPORORNIS*
1 species



*O. agilis*
Connecticut Warbler

*GEOTHLYPIS*
12 species



*G. trichas*
Common Yellowthroat

*CATHAROPEZA*
1 species



*C. bishopi*
Whistling Warbler

*SETOPHAGA*
33 species



*S. pitiayumi*
Tropical Parula

*MYIOTHLYPIS*
15 species



*M. basilica*
Santa Marta Warbler

*BASILEUTERUS*
10 species



*B. culicivorus*
Golden-crowned Warbler

*CARDELLINA*
5 species



*C. rubrifrons*
Red-faced Warbler

*MYIOBORUS*
12 species



*M. torquatus*
Collared Whitestart

Passeriformes, Passeroid Oscines

# PHAENICOPHILIDAE
## Hispaniolan Tanagers

3 genera • 4 species

**Related Families** Nesospingidae (Puerto Rican Tanager), Spindalidae (stripe-headed tanagers)

**Similar Birds** Tanagers (Thraupidae), warblers (Parulidae), apalises (Cisticolidae)

**Description**
- Plumage gray and white on the underside and olive-green on the back and wings, often with a gray or black hood with white accents
- Wings short to medium; tail medium-long
- Body small to medium, cylindrical ovoid
- Bill medium length, slightly inflated
- Head small to medium; neck short to medium
- Legs short to medium; feet large
- Sexes similar

**Habitat** The Hispaniolan tanagers live in a wide variety of habitats, including arid scrub, highland pine forest, and broadleaf evergreen forest.

**Food** The diet and foraging behaviors of the Hispaniolan tanagers are not well studied. The two *Phaenicophilus* palm-tanagers primarily glean insects from leaves and eat lesser amounts of fruit. The diets of the *Microligea* and *Xenoligea* warblers are less well known, although these birds are known to feed on seeds, fruit, and insects.

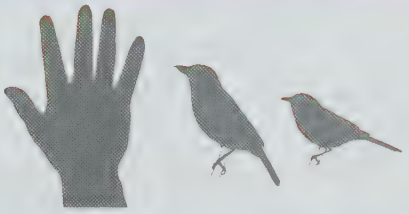
**Breeding** Very little is known about the breeding biology of the Hispaniolan tanagers. It is presumed that they are monogamous with biparental care. They construct simple cup nests out of twigs, leaves, moss, stems, and other plant matter. Nests are typically placed in a shrub or tree. Females typically lay 2 to 4 eggs.



Black-crowned Palm Tanager, *Phaenicophilus palmarum*. Santo Domingo National Botanical Gardens, Dominican Republic. © Dubi Shapiro.

No data are available on the parental care of the Hispaniolan tanagers, although it is likely that both male and female are active in feeding young. One record from *Phaenicophilus* indicates incubation and nestling periods of about ten days each.

**Conservation** Habitat loss is the primary threat facing phaenicophilids, two species of which (50%) are of conservation concern (1 NT, 1 VU). The vulnerable White-winged Warbler *Xenoligea montana* has a severely fragmented range and rapidly declining population owing





This group of tanagers, including two genera once thought to be warblers, is limited to the single island of Hispaniola in the Caribbean. All are a variation on an olive-backed, fairly long-tailed songbird with gray or white below and some kind of white accent in a gray or black face. Their calls are seldom really melodic; sometimes throaty and jay-like, other times sibilant and strident like an irritated cardinal, they are almost always simple in structure. Only future work will help us understand better whether this family, one of several endemic to Hispaniola, represents a stalled dead end, or a focus of future diversifications to come.



Green-tailed Warbler, *Microligea palustris*. Sierra de Bahoruco, Dominican Republic. © Dubi Shapiro.

to the clearing of highland forest for agriculture and logging and possibly to predation by introduced mammals. Similarly, widespread deforestation is thought to be responsible for the decline of the Gray-crowned Palm-tanager *Phaenicophilus poliocephalus*.

Relationships The Hispaniolan tanagers are part of the large New World radiation of nine-primaried oscines within the superfamily Passeroidea. The taxonomic affinities of these birds have long been unclear, and the species now grouped into Phaenicophilidae were not always considered to be closely related, with *Microlegia* and *Xenolegia* traditionally placed in Parulidae (Lovette & Bermingham 2002, Lovette *et al.* 2010) and *Phaenicophilus* placed in Thraupidae (Burns 1997). Molecular phylogenetic studies indicate, however, that this small radiation of Hispaniolan endemic passerines forms a clade that is probably most closely related to two other lineages of Caribbean endemics, Nesospingidae and Spindalidae (Barker *et al.* 2013).



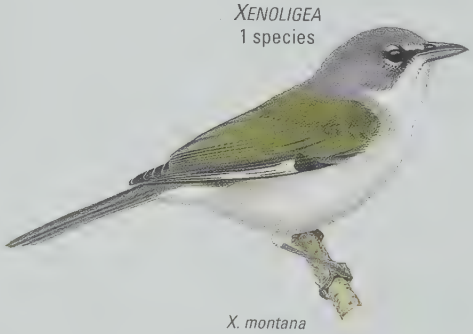
White-winged Warbler, *Xenoligea montana*. Zapotén, Dominican Republic. © Ian Davies.

*PHAENICOPHILUS*
2 species



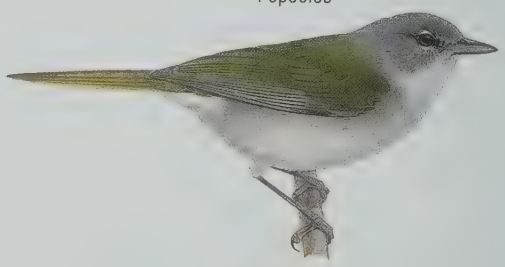
*P. poliocephalus*
Gray-crowned Palm Tanager

*XENOLIGEA*
1 species



*X. montana*
White-winged Warbler

*MICROLIGEA*
1 species



*M. palustris*
Green-tailed Warbler

Passeriformes, Passeroid Oscines

# SPINDALIDAE
## Stripe-headed Tanagers

1 genus • 4 species

**Related Families** Nesospingidae (Puerto Rican Tanager), Phaenicophilidae (Hispaniolan tanagers)

**Similar Birds** Tanagers (Thraupidae), buntings (Cardinalidae and Emberizidae)

**Description**
- Male with striking black-and-white head and body pattern, with yellow, orange, and rufous below; females dull olive-green overall
- Wings medium-long; tail medium-long
- Body medium-small, cylindrical ovoid
- Bill short, stout, sharp
- Head medium-large; neck medium-long, thick
- Legs and feet short and stout
- Males brighter and more boldly patterned than females

**Habitat** The stripe-headed tanagers live in a variety of habitats, including shrubby second growth, open woodland, montane forest, and plantations.

**Food** Spindalises primarily eat fruit, especially berries. They also feed on leaves and buds and a variety of insects and other invertebrates, especially those that they encounter in fruiting clusters. They forage in all strata of vegetation.

**Breeding** Very little information is available on the breeding biology of spindalises, although it appears they are monogamous with biparental care. Nests are open cups built of palm fronds, grass, and rootlets, and are typically placed 1 to 5 m up in a tree or shrub. Females typically lay 2 or 3 eggs. The respective roles of the male and female in parental care are unclear, but both male and female have been observed actively defending a nest from potential predators.

**Conservation** No spindalid species faces immediate conservation concerns.



Western Spindalis, *Spindalis zena*.
Cayo Coco, Cuba. © Christian Artuso.





**Relationships** Spindalidae is part of the New World radiation of nine-primaried oscines within the superfamily Passeroidea. Like several other newly recognized families in this group, these birds were long thought to be part of the large, diverse Thraupidae (Burns 1997). Molecular phylogenetic studies have suggested instead that Spindalidae is part of a clade of other Caribbean tanager-like birds. The most recent well-sampled study (Barker *et al.* 2013) indicates that Spindalidae is likely sister to Nesospingidae, and together with it, sister to the Phaenicophilidae. These three Caribbean tanager families are in turn likely sister to the clade made up of Parulidae, Icteridae, Zeledoniidae, and Teretistridae.

The stripe-headed tanagers, or the spindalises, are a small group of four species of tanager-like fruit-eaters that are endemic to the Greater Antilles islands of the Caribbean. Each species occupies a different island in the Caribbean chain. Males in this family are clothed in fiery oranges and boldly patterned with black and white; not surprisingly the females are far more muted in their plumage. All the species are similar in appearance, varying slightly in size and details of plumage, and they all give high sibilant calls. When they sing the notes get a little more emphatic and are delivered in an accelerating or decelerating trill.



Western Spindalis, *Spindalis zena*. San Miguel, Cozumel Island, Quintana Roo, Mexico. © Ian Davies.

*SPINDALIS*
4 species



*S. portoricensis*
Puerto Rican Spindalis

# NESOSPINGIDAE

## Puerto Rican Tanager

1 genus · 1 species

**Related Families** Spindalidae (stripe-headed tanagers), Phaenicophilidae (Hispaniolan tanagers)

**Similar Birds** Tanagers (Thraupidae), woodshrikes (Vangidae), chat-tanagers (Calyptophilidae)

**Description**

- Plumage gray-brown above, dull white with faint streaks below
- Wings medium-short; tail medium-long
- Body medium-sized, cylindrical ovoid with horizontal carriage
- Bill medium-short, stout, and slightly inflated
- Head large; neck short, thick
- Legs and feet short and stout
- Sexes similar

**Habitat** The Puerto Rican Tanager lives mainly in humid foothill and montane forest, but also occurs in lower elevations in palm forests, coffee plantations, and thickets, from about 200 to 1400 m elevation.

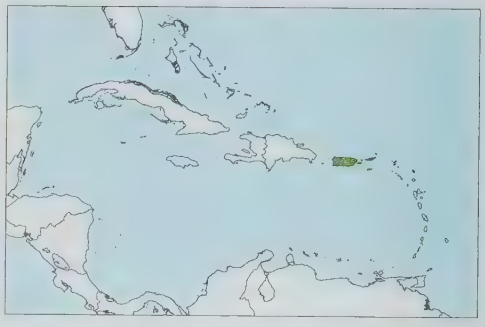
**Food** Puerto Rican Tanagers feed on a broad range of foods, from invertebrates (including insects, snails, and slugs) and small vertebrates (including lizards and frogs), to fruits and seeds.

**Breeding** Very little information is available on the breeding biology of the Puerto Rican Tanager, and no detailed study has been undertaken. The nest of this species is a loosely woven open cup built of grass and feathers, which is typically placed in a small tree. Females lay 2 or 3 eggs. The roles of the male and female in parental care are unknown, as are the rates of offspring development.



Puerto Rican Tanager, *Nesospingus speculiferus*. Puerto Rico. © Adrian & Jane Binns / VIREO.





**Conservation** The Puerto Rican Tanager does not face any immediate conservation concerns.

**Relationships** The Puerto Rican Tanager is part of the New World radiation of nine-primaried oscines within the superfamily Passeroidea. Like several other newly recognized families in this group, the Puerto Rican Tanager was long thought to be part of the large, diverse Thraupidae (Burns 1997). The most recent molecular phylogenetic evidence suggests that Nesospingidae is part of a clade of Caribbean "tanagers" that are not part of the Thraupidae radiation; within this small clade, *Nesospingus* is likely sister to Spindalidae, and these together are in turn sister to Phaenicophilidae (Barker *et al.* 2013).

Only a few nests have ever been reported for the Puerto Rican Tanager *Nesospingus speculiferus*, endemic to the Caribbean island of Puerto Rico. But outside the breeding season, this species is often heard, though rarely seen, as it forages in dense vegetation. Unlike most species known as "tanagers," these birds are solemnly clad in dusky gray-brown and white. Their voice hardly qualifies as a song, though they call often, usually with a harsh single note much like the "scolding" call of other species. These tanagers forage in small groups, often serving as the nuclear species for mixed-species foraging flocks. At night these flocks roost together, but there is still much to learn about this species' social and reproductive behavior.



Puerto Rican Tanager, *Nesospingus speculiferus*. El Yunque, Puerto Rico. © Dubi Shapiro.

*NESOSPINGUS*
1 species



*N. speculiferus*
Puerto Rican Tanager

Passeriformes, Passeroid Oscines

# CALYPTOPHILIDAE
## Chat-Tanagers

1 genus • 2 species

**Related Families** Cardinalidae (cardinals), Thraupidae (tanagers), Mitrospingidae (miscellaneous tanagers)

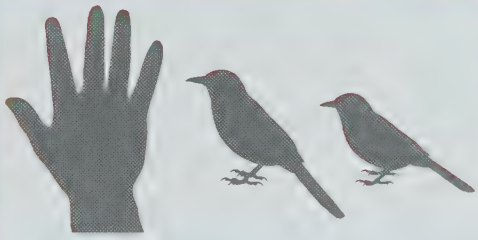
**Similar Birds** Catbirds (Mimidae), chats (Muscicapidae), thrushes (Turdidae), brush-finches (Passerellidae)

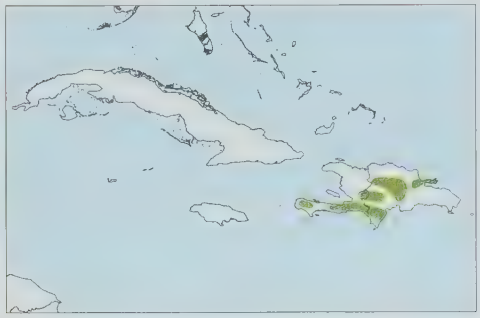
**Description**
- Plumage dark brown above, white and gray below, with yellow eye-ring
- Wings short; tail long, rounded
- Body medium-sized, cylindrical ovoid with horizontal carriage
- Bill straight, pointed
- Head medium-sized; neck thick
- Legs medium-long; feet large
- Sexes similar

**Habitat** The chat-tanagers live primarily in montane forests, in dense, wet broadleaf evergreen forests, and pine forests with dense understory, and they occur at lower elevations in the thickets bordering many streams.



Eastern Chat-Tanager, *Calyptophilus frugivorus*. Sierra de Bahoruco NP, Pueblo Viejo, Dominican Republic. © Doug Wechsler / VIREO.





Yet another small group of passeroids endemic to the central Caribbean island of Hispaniola, these two species of long-tailed, little-known, seldom-seen passerines are worthy of their Greek name, Calyptophilus ("loving to hide"). These drably attired birds spend all their time in the dense undergrowth of humid island forests, and consequently there are large gaps in our knowledge of their biology. Despite their secretive nature, they are highly territorial. Both sexes declare their territories with loud, emphatic, simple songs of whipped whistled notes, mostly at dawn and often antiphonally. The pairs seem to stay together much or all of the year, spending their lives searching out invertebrate prey on the ground and in low vegetation in their dense thicket homes.

**Food** In spite of the epithet *frugivorus* for the Eastern Chat-tanager, calyptophilids feed primarily on insects and other invertebrates, only occasionally taking fruits and seeds. They forage in pairs on or near the ground in dense undergrowth.

**Breeding** Very little information on the breeding biology of the chat-tanagers exists. The two nests described were bulky, partially domed structures built of twigs, tendrils, moss, and lichens, covered partially by the whole leaves of broadleaf plants and lined with fine stems and bits of leaf. One was placed in a dense thicket and the other in a forest clearing. Only one was successful in hatching chicks, which were fed by both parents, but the chicks were preyed upon before they fledged. No further details on breeding biology are available.

**Conservation** Habitat loss and fragmentation are the primary threats facing calyptophilids, and one species (50%) is considered to be of conservation concern (1 VU). The Eastern Chat-tanager *Calyptophilus frugivorus* has declined drastically as its habitat has been cleared for agriculture and logging. Although the threat status of the Western Chat-tanager *Calyptophilus tertius*, which was recently split from the former species, has not yet been evaluated, this species is likely also to receive a vulnerable listing in the future.

**Relationships** Calyptophilidae is part of the large New World radiation of nine-primaried oscines within the superfamily Passeroidea. The chat-tanagers were long classified as part of Thraupidae, but molecular phylogenetic studies show that they instead appear to be the sister lineage to the large clade that includes Cardinalidae, Thraupidae, and Mitrospingidae (Barker *et al.* 2013).



Eastern Chat-Tanager, *Calyptophilus frugivorus*. Cachote, Dominican Republic. © Dubi Shapiro.

*CALYPTOPHILUS*
2 species



*C. tertius*
Western Chat-Tanager

# MITROSPINGIDAE

## Miscellaneous Tanagers

3 genera • 4 species

**Related Families** Thraupidae (tanagers), Cardinalidae (cardinals and allies), Calyptophilidae (chat-tanagers)

**Similar Birds** Tanagers (Thraupidae), cardinals (Cardinalidae)

**Description**

- Plumage yellow-olive and gray, or black-gray-and-white
- Wings short to medium; tail medium-long
- Body medium-sized, cylindrical ovoid
- Bill medium length, inflated, heavy and bright red in *Lamprospiza*, black and more slender in other species
- Head small to medium; neck medium length and width
- Legs and feet short to medium, stout
- Sexes similar

**Habitat** The mitrospingids live in tropical forest and associated edge habitats, from sea level up to low mountains.

**Food** These tanagers feed on a variety of foods, particularly insects gleaned from leaves and branches, as well as other invertebrates escaping from army ant swarms. All species supplement their diets with fruits of many kinds.

**Breeding** Very little information is available on the breeding biology of these four species. Only the Dusky-faced Tanager *Mitrospingus cassinii* has been studied; observations of at least three individuals feeding chicks at a nest suggest that this species breeds cooperatively. The Dusky-faced Tanager builds an open cup nest constructed from flower stems, rootlets, and black fungal filaments that is slung between two upright branches. During the single study of this species' breeding biology, only a single adult participated in nest construction. Females lay 1 or 2 eggs. Both male and female, and helpers if present, are active in feeding the chicks in the nest.

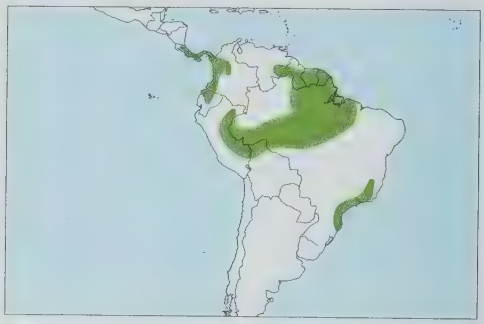
**Conservation** No mitrospingid species faces immediate conservation concerns.

**Relationships** Mitrospingidae is part of the New World radiation of nine-primaried oscines



Dusky-faced Tanager, *Mitrospingus cassinii*. Río Palenque Reserve, Ecuador. © Glenn Bartley / VIREO.





This small but eclectic family contains four "tanager" species that have been united recently by molecular analyses. Three of the four resemble thraupid tanagers set in muted grays, olives, and browns, while the fourth is bold, black-and-white, with a bright red bill. All are gregarious insectivores that supplement their diets with fruit. As they forage, moving through the vegetation in loose bands over large ranges, they give a series of sharp strident calls, sometimes aggregated rhythmically into a song. Some of the species often form mixed-species flocks, whereas others seem not to mingle. They all jump or bound rather heavily through the branches.



Olive-green Tanager, *Orthogonys chloricterus*. Atlantic Rainforest, Brazil. © Glenn Bartley / VIREO.

within the superfamily Passeroidea. Like many newly recognized families within the New World passeroid radiation, the mitrospingids were long considered part of Thraupidae. However, genetic evidence suggests that they are not included within Thraupidae (Klicka *et al.* 2007), and are instead likely sister to the clade made up of Cardinalidae plus Thraupidae (Barker *et al.* 2013).



Red-billed Pied Tanager, *Lamprospiza melanoleuca*. Brazil. © Crawford H. Greenewalt / VIREO.

*LAMPROSPIZA*
1 species



*L. melanoleuca*
Red-billed Pied Tanager

*MITROSPINGUS*
2 species



*M. cassinii*
Dusky-faced Tanager

*ORTHOGONYS*
1 species



*O. chloricterus*
Olive-green Tanager

# CARDINALIDAE
## Cardinals and Allies

11 genera • 51 species

**Related Families** Thraupidae (tanagers)

**Similar Birds** Finches (Fringillidae), tanagers (Thraupidae), sparrows and buntings (Passerellidae, Emberizidae, Passeridae)

**Description**
- Plumage colorful and patterned with large swatches of color, most often red, yellow, blue, and/or black
- Wings medium-long; pointed; tail medium to long
- Body small to medium, cylindrical ovoid, commonly with upright carriage
- Bill short to medium, most often deep and inflated
- Head medium to large; neck medium
- Legs and feet short to medium
- Males generally brighter and more boldly patterned than females

**Habitat** The cardinals and their allies live in a broad array of habitats, from forests to grassland and arid scrubland.

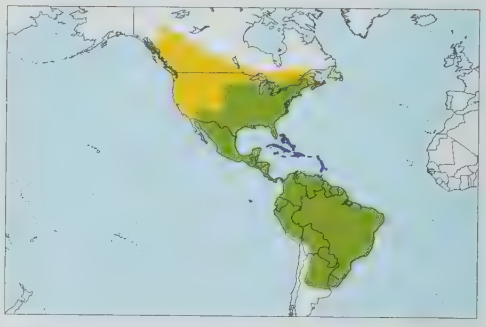
**Food** There is a strong divergence in food preferences within the Cardinalidae. Two distinct bill morphologies are found among species in the family, with some having heavy, conical, seed-crushing bills and others having slightly longer and less deep bills. Members of the first group, including the grosbeaks, buntings, and cardinals, feed heavily on fruits and seeds, especially during the non-breeding season. During the breeding season, they also feed on insects and other invertebrates. Some species, such as the Dickcissel *Spiza americana*, feed almost entirely on seeds during the non-breeding season. Members of the second group, previously placed with the tanagers, feed primarily on insects and fruit.

**Breeding** Most cardinalids are monogamous with biparental care, though polygyny, shared nests, and cooperative breeding all seem to occur in some species at least occasionally. Dickcissels are commonly polygynous, and a male that defends a higher-quality territory might attract as many as six females to his territory. The nests of cardinalids are a simple open cup constructed of grass, twigs, rootlets, stems, and other vegetation, lined with finer material such as hair; sometimes they include snake skins (or cellophane) or are bound in part by spider silk. Nests are placed in well-concealed sites, anywhere from on the ground to high in dense vegetation. Nest-building is by both male and female or by the female alone. Females typically lay 1 to 6 eggs. Incubation is generally by the female alone, and takes 11 to 14 days. In some species, the female is largely responsible for feeding chicks, but in others, both male and female share provisioning duties. Young leave the nest after 9 to 12 days there, though some may leave if disturbed after as soon as 7 days, and nestlings in at least one species will stay for up to 15 days. The young are fed for up to several weeks post-fledging.



Pyrrhuloxia, *Cardinalis sinuatus*.
Rio Grande Valley, Texas, USA. © Mark A. Chappell.





About half the species in the family have deep seed-eating bills, and all have plumages dominated by bold large-brush patterns in primary, generally matte, blues, reds and yellows; some of the buntings are luminous in their delicately blended shades of pink and blue. Remarkably, many of the species with dramatically more colorful males are still socially monogamous, with the males taking an active role in rearing the young. Thus, simple sexual selection does not explain all the elaboration of colors in this group. In appearance and ecology, this family overlaps a great deal with many thraupids, but, unlike them, it is centered in the Northern Hemisphere and contains a much higher proportion of migrating and seed-eating forms.



Gray-throated Chat, *Granatellus sallaei*. Calakmul Biosphere Reserve, Campeche, Mexico. © Ian Davies.

**Conservation** Habitat loss is the primary threat facing cardinalids, six species of which (12%) are of conservation concern (4 NT, 1 EN, 1 CR). The critically endangered Carrizal Seedeater *Amaurospiza carrizalensis* was not discovered by science until 2003 and is limited to spiny bamboo thickets in the understory of deciduous forest in a tiny range in the remote southeastern corner of Venezuela. Although population surveys are hindered by remoteness and the forbidding habitat, all efforts are intensified by the loss of habitat to deforestation and flooding by hydroelectric dams. The endangered Black-cheeked Ant-tanager *Habia atrimaxillaris*, endemic to the Osa Peninsula in Costa Rica, is considered endangered due to habitat destruction within its restricted range. The Rose-bellied Bunting *Passerina rositae*, found in a small area

of Oaxaca and Chiapas, Mexico, is considered to be near threatened, and may be declining as a result of continued habitat degradation and development.

**Relationships** Cardinalidae is part of the New World radiation of nine-primaried oscines within the superfamily Passeroidea. Cardinalidae is most likely sister to Thraupidae, a relationship that is supported by a wealth of morphological and genetic data (Burns 1997, Yuri & Mindell 2002, Ericson & Johansson 2003, Klicka *et al.* 2007, Barker *et al.* 2013). This cardinal/tanager clade is most likely sister to Mitrospingidae, with these three families together forming a clade with Calyptophilidae (Barker *et al.* 2013). Molecular phylogenetic surveys have shown that a number of genera traditionally placed within Cardinalidae are embedded within other families, and conversely, birds traditionally placed in other families belong with the cardinals, with notable additions to Cardinalidae including the *Granatellus* chats *Piranga* and *Habia* tanagers (Klicka *et al.* 2007, Barker *et al.* 2013, Burns *et al.* 2014).



Dickcissel, *Spiza americana*. Konza Prairie, Kansas, USA. © Mark A. Chappell.

*PHEUCTICUS*
6 species

*P. chrysopeplus*
Yellow Grosbeak

*GRANATELLUS*
3 species

*G. pelzelni*
Rose-breasted Chat

*SPIZA*
1 species

*S. americana*
Dickcissel

*PASSERINA*
7 species

*P. ciris*
Painted Bunting

*CYANOCOMPSA*
1 species

*C. parellina*
Blue Bunting

*AMAUROSPIZA*
3 species

*A. concolor*
Blue Seedeater

*CYANOLOXIA*
3 species

*C. glaucocaerulea*
Glaucous-blue Grosbeak

*HABIA*
9 species

*H. rubica*
Red-crowned Ant-tanager

*PIRANGA*
11 species

*P. olivacea*
Scarlet Tanager

*CARDINALIS*
3 species

*C. cardinalis*
Northern Cardinal

*CARYOTHRAUSTES*
4 species

*C. poliogaster*
Black-faced Grosbeak

# THRAUPIDAE
## Tanagers and Allies

98 genera • 377 species

**Related Families** Cardinalidae (cardinals and allies), Mitrospingidae (miscellaneous tanagers)

**Similar Birds** Other tanagers (Cardinalidae, Spindalidae, Phaenicophilidae, Mitrospingidae), finches, euphonias, honeycreepers (Fringillidae), sparrows and buntings (Passerellidae, Emberizidae, Passeridae, Thraupidae), sunbirds (Nectariniidae), honeyeaters (Meliphagidae), flowerpeckers (Dicaeidae)

**Description**

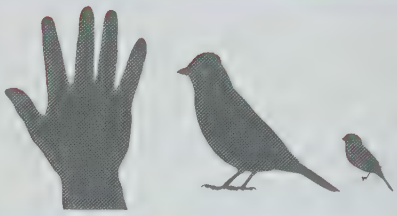
- Plumage earth-toned in many seed-eating species, very colorful and idiosyncratically patterned in many nectar- and fruit-feeding species
- Wings medium-long; tail mostly medium length
- Body small to medium, cylindrical ovoid, most with horizontal carriage
- Bill generally short to medium: thin, decurved, and pointed in many nectarivorous species; conical in granivores; inflated in many frugivores
- Head small to medium; neck short, thick
- Legs and feet generally short to medium
- Males often more brightly colored and boldly patterned than females, but a surprising number of bright species are sexually monomorphic

**Habitat** The tanagers and their allies live in nearly all terrestrial habitats of the Neotropics, from lowland rainforest, seasonal scrubland and arid grasslands, to high-altitude puna, rock-slopes, and snow fields.

**Food** Tanagers have a vast variety of bill shapes, and thus their ranks include insectivores, frugivores, nectarivores, granivores, and just about every combination thereof. Like their varied diets, their foraging strategies are equally diverse, including gleaning, probing, pecking, fly-catching, and scratching on the ground. Some specialize on food sources suited to a particular type of bill. One such group is the *Diglossa* flowerpiercers, which use their hooked bills to pierce the bases of flowers to "steal" nectar, bypassing the stamens and pistil of the flower in obtaining their meal. Other species that feed on nectar, such as honeycreepers (*Cyanerpes* and others), use their long bills to probe into flowers. Some insectivorous species follow army-ant swarms, although none are ant-followers as



Diademed Tanager, *Stephanophorus diadematus*. Near São Paulo, Brazil. © Christopher L. Wood.





One of two great assemblages of passerines found in the Neotropics, the tanagers have diversified the most from those that long-ago colonized the region from the north. With some of the most stunning and idiosyncratic combinations of colors and patterns found in any birds, their morphological variation is just as remarkable—from the distinctively hooked bills of the flowerpiercers all the way to the deep seed-cracking bills of Darwin's Finches. Most eat diets that include seeds or fruit and insects. Monogamous mating systems are surprisingly predominant in this diverse and brightly adorned group. It is thus surprising that, as in cardinalids, the route to spectacular diversity of plumages appears not to have been through the simple action of sexual selection.



Golden-eared Tanager, *Tangara chrysotis*. Manu Road, San Pedro, Peru. © Mark A. Chappell.

specialized as are some of the New World suboscines.

**Breeding** Tanagers are primarily monogamous with biparental care. Evidence suggests that a few species, notably the *Ramphocelus* tanagers, may rarely be polygynous. Some species, including several *Tangara* tanagers, are known to have helpers that help feed young. Nests of most species are simple cups constructed with twigs, grass, leaves, and other plant material, which can be placed in a variety of locations. Some species, including the *Geospiza* ground-finches, build domed nests of grass. Another, the Saffron Finch *Sicalis flaveola*, regularly uses the old enclosed mud nests of *Furnarius* horneros (Furnariidae) when available, and the Swallow Tanager *Tersina viridis* regularly nests in adopted cavities or burrows, sometimes digging its own burrow in soft earth. This family also contains the only passerine species that is known to nest directly on glacial ice, the White-winged Diuca-finch *Diuca speculifera*. Females typically lay 1 to 4 eggs, with 1 or 2 most common in lowland species. Females alone incubate the eggs, and incubation takes 12 to 14 days, with periods of up to 17 days in the cavity-nesting *Tersina*. Both males and females generally help feed the chicks, and the nestlings leave the nest after 11 to 20 days, with shorter nestling periods for more-exposed nests near the ground. Post-fledging care appears to vary from almost none to occasional feeding by the parents for months after the young leave the nest.

**Conservation** Habitat loss and introduced predators are the primary threats facing thraupids, 61 species of which (16%) are of conservation concern (20 NT, 24 VU, 12 EN, 5 CR). The critically endangered of these species include two *Camarhynchus* tree-finches from the Galapagos, each of which has a very small population limited to a single island in the archipelago, and the Gough Bunting *Rowettia goughensis* of Tristan da Cunha in the South Atlantic Ocean. These island endemics are particularly at risk from introduced predators, including rats, fire ants, and cats. Other critically endangered species are the Cherry-throated Tanager *Nemosia rourei*, restricted to Atlantic forest fragments at a handful of scattered sites in coastal Brazil threatened by human development, and the Cone-billed Tanager *Conothraupis mesoleuca*, limited to a handful of seasonally flooded forest patches in central Brazil threatened by hydroelectric development. Among the endangered thraupids, many are mountain birds with very small, local ranges, including the Plain-tailed Warbling Finch *Poospiza alticola*, Gold-ringed Tanager *Bangsia aureocincta*, Golden-backed Mountain-tanager *Cnemathraupis aureodorsalis*, Azure-rumped Tanager *Tangara cabanisi*, and Venezuelan and Chestnut-bellied Flowerpiercers *Diglossa venezuelensis* and *D. gloriosissima*, respectively. All these high-elevation species are particularly at risk from encroaching habitat loss to agriculture, logging, and fire.



Rusty-browed Warbling Finch, *Microspingus erythrophrys*. Yala, Jujuy, Argentina. © Ian Davies.



Bay-headed Tanager, *Tangara gyrola*. Pérez Zeledón, Costa Rica. © Alex Vargas.

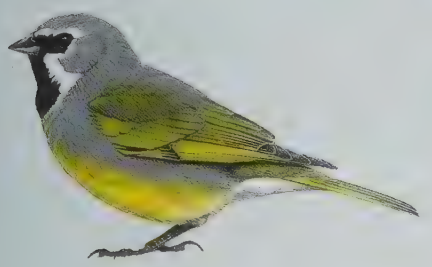


Green-headed Tanager, *Tanagara seledon*. Near São Paulo, Brazil. © Christopher L. Wood.

**Relationships** Within the superfamily Passerioidea, the tanager family is the largest in the New World radiation of nine-primaried oscines. Thraupidae is likely sister to Cardinalidae, a relationship that has received strong support in a number of studies (Yuri & Mindell 2002, Ericson *et al.* 2003b, Ericson & Johansson 2003, Klicka *et al.* 2007, Alström *et al.* 2008, Barker *et al.* 2013). Thraupidae and Cardinalidae together are likely sister to the newly recognized family, Mitrospingidae (Barker *et al.* 2013). Morphological diversity of the family was further increased by recent inclusion of lineages traditionally placed outside Thraupidae. These include many seed-eating birds traditionally placed with Passerellidae, including *Geospiza*, *Tiaris*, *Poospiza*, and *Sporophila* (Klicka *et al.* 2007, Barker *et al.* 2013, Buns *et al.* 2014). Another is the Bananaquit *Coereba flaveola*, a species whose relationships had long been uncertain, and which has often been recognized as a separate family. It is now embedded within Thraupidae and is part of a clade that includes many seed-eating species, a testament to the rapid evolution of beak morphology in this family (Klicka *et al.* 2007, Alström *et al.* 2008, Barker *et al.* 2013, Burns *et al.* 2014).


CYANICTERUS
1 species
C. cyanicterus
Blue-backed Tanager
NEMOSIA
2 species
N. pileata
Hooded Tanager
COMPSOTHRAUPIS
1 species
C. loricata
Scarlet-throated Tanager
SERICOSSYPHA
1 species
S. albocristata
White-capped Tanager
ORCHESTICUS
1 species
O. abeillei
Brown Tanager
PARKERTHRAUSTES
1 species
P. humeralis
Yellow-shouldered Grosbeak
CATAMBLYRHYNCHUS
1 species
C. diadema
Plushcap
CHLOROPHANES
1 species
C. spiza
Green Honeycreeper
IRIDOPHANES
1 species
I. pulcherrimus
Golden-collared Honeycreeper
CHRYSOTHLYPIS
2 species
C. chrysomelas
Black-and-yellow Tanager
HETEROSPINGUS
2 species
H. xanthopygius
Scarlet-browed Tanager
HEMITHRAUPIS
3 species
H. guira
Guira Tanager
CONIROSTRUM
11 species
C. sitticolor
Blue-backed Conebill
SICALIS
12 species
S. flaveola
Saffron Finch
PHRYGILUS
4 species
P. atriceps
Black-hooded Sierra Finch
NESOSPIZA
3 species
N. questi
Nightingale Finch
ROWETTIA
1 species
R. goughensis
Gough Finch

*Melanodera*
2 species



*M. melanodera*
Canary-winged Finch

*Catamenia*
3 species



*C. analis*
Band-tailed Seedeater

*Diglossa*
18 species



*D. mystacalis*
Moustached Flowerpiercer

*Idiopsar*
3 species



*I. brachyurus*
Short-tailed Finch

*Xenodacnis*
1 species



*X. parina*
Tit-like Dacnis

*Geospizopsis*
2 species



*G. unicolor*
Plumbeous Sierra Finch

*Haplospiza*
3 species



*H. rustica*
Slaty Finch

*Volatinia*
1 species



*V. jacarina*
Blue-black Grassquit

*Conothraupis*
2 species



*C. speculigera*
Black-and-white Tanager

*Creurgops*
2 species



*C. verticalis*
Rufous-crested Tanager

*Tachyphonus*
8 species



*T. cristatus*
Flame-crested Tanager

*Eucometis*
1 species



*E. penicillata*
Gray-headed Tanager

*Trichothraupis*
1 species



*T. melanops*
Black-goggled Tanager

*Coryphospingus*
2 species



*C. cucullatus*
Red-crested Finch

*Ramphocelus*
10 species



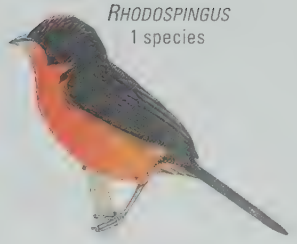
*R. bresilius*
Brazilian Tanager

*Lanio*
4 species



*L. fulvus*
Fulvous Shrike-Tanager

*Rhodospingus*
1 species



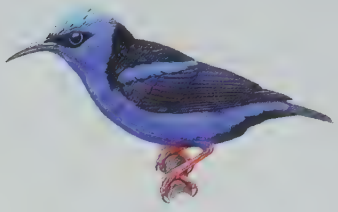
*R. cruentus*
Crimson-breasted Finch

*Charitospiza*
1 species



*C. eucosma*
Coal-crested Finch

*Cyanerpes*
4 species



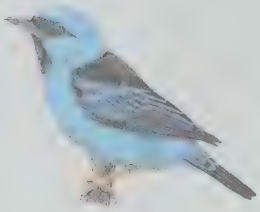
*C. cyaneus*
Red-legged Honeycreeper

*Tersina*
1 species



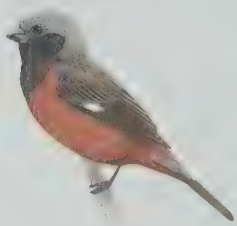
*T. viridis*
Swallow Tanager

*Dacnis*
10 species



*D. cayana*
Blue Dacnis

*Sporophila*
39 species



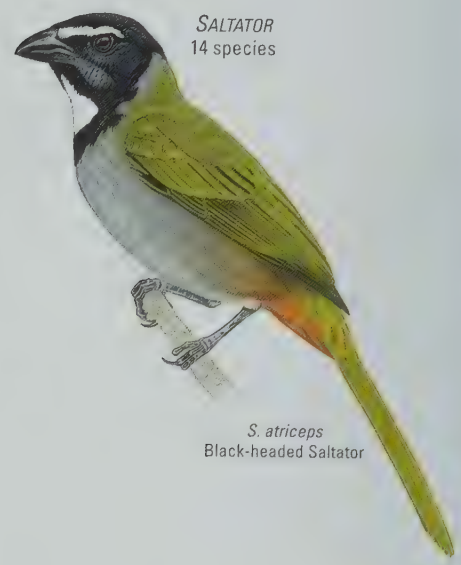
*S. ruficollis*
Dark-throated Seedeater

*Saltatricula*
2 species



*S. multicolor*
Many-colored Chaco Finch

*Saltator*
14 species



*S. atriceps*
Black-headed Saltator

*Coryphaspiza*
1 species



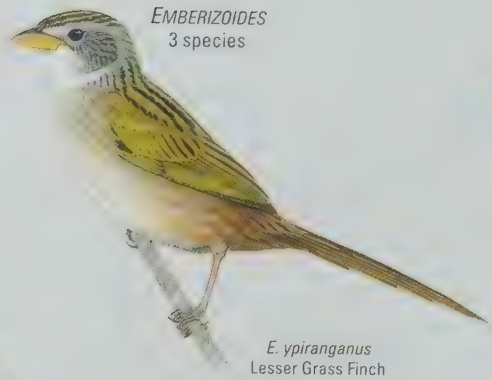
*C. melanotis*
Black-masked Finch

*Embernagra*
2 species



*E. platensis*
Great Pampa Finch

*Emberizoides*
3 species



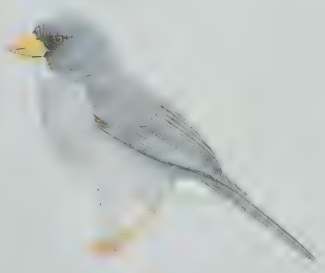
*E. ypiranganus*
Lesser Grass Finch

*Xenospingus*
1 species



*X. concolor*
Slender-billed Finch

*Piezorina*
1 species



*P. cinerea*
Cinereous Finch

*Pseudospingus*
2 species



*P. verticalis*
Black-headed Hemispingus

*Cnemoscopus*
1 species



*C. rubrirostris*
Gray-hooded Bush Tanager

*Poospiza*
8 species



*P. nigrorufa*
Black-and-rufous Warbling Finch

*Orospingus*
2 species



*O. rufosuperciliaris*
Rufous-browed Hemispingus

*Compsospiza*
2 species



*C. garleppi*
Cochabamba Mountain Finch

*Hemispingus*
6 species



*H. auricularis*
White-browed Hemispingus

*Sphenopsis*
4 species



*S. piurae*
Piura Hemispingus

*Pyrrhocoma*
1 species



*P. ruficeps*
Chestnut-headed Tanager

*Thlypopsis*
6 species



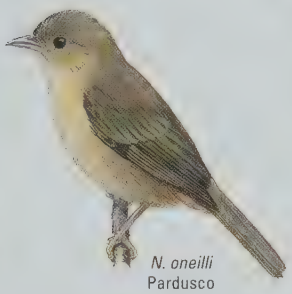
*T. fulviceps*
Fulvous-headed Tanager

*Microspingus*
8 species



*M. alticola*
Plain-tailed Warbling Finch

*Nephelornis*
1 species



*N. oneilli*
Pardusco

*Urothraupis*
1 species



*U. stolzmanni*
Black-backed Bush Tanager

*Cypsnagra*
1 species



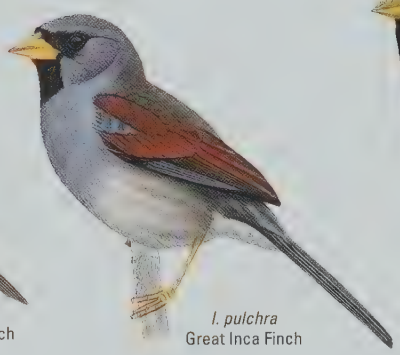
*C. hirundinacea*
White-rumped Tanager

*Donacospiza*
1 species



*D. albifrons*
Long-tailed Reed Finch

*Incaspiza*
5 species



*I. pulchra*
Great Inca Finch

*Rhopospina*
4 species



*R. fruticeti*
Mourning Sierra Finch

*Coereba*
1 species



*C. flaveola*
Bananaquit

*Tiaris*
3 species



*T. olivaceus*
Yellow-faced Grassquit

*Euneornis*
1 species



*E. campestris*
Orangequit

*Melopyrrha*
3 species



*M. nigra*
Cuban Bullfinch

*Loxipasser*
1 species



*L. anoxanthus*
Yellow-shouldered Grassquit

*PHONIPARA*
1 species



*P. canora*
Cuban Grassquit

*MELANOSPIZA*
2 species



*M. richardsoni*
St Lucia Black Finch

*LOXIGILLA*
2 species



*L. noctis*
Lesser Antillean Bullfinch

*CERTHIDEA*
2 species



*C. olivacea*
Green Warbler-Finch

*PLATYSPIZA*
1 species



*P. crassirostris*
Vegetarian Finch

*GEOSPIZA*
6 species



*G. conirostris*
Large Cactus Finch

*CAMARHYNCHUS*
5 species



*C. psittacula*
Large Tree Finch

*PINAROLOXIAS*
1 species



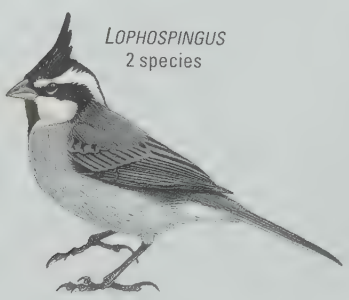
*P. inornata*
Cocos Finch

*CHLOROCHRYSA*
3 species



*C. nitidissima*
Multicolored Tanager

*LOPHOSPINGUS*
2 species



*L. pusillus*
Black-crested Finch

*NEOTHRAUPIS*
1 species



*N. fasciata*
White-banded Tanager

*DIUCA*
2 species



*D. diuca*
Common Diuca Finch

*GUBERNATRIX*
1 species



*G. cristata*
Yellow Cardinal

*PAROARIA*
6 species



*P. coronata*
Red-crested Cardinal

*STEPHANOPHORUS*
1 species



*S. diadematus*
Diademed Tanager

*Schistochlamys*
2 species

*S. melanopis*
Black-faced Tanager

*Cissopis*
1 species

*C. leverianus*
Magpie Tanager

*Calochaetes*
1 species

*C. coccineus*
Vermilion Tanager

*Iridosornis*
5 species

*I. jelskii*
Golden-collared Tanager

*Pipraeidea*
1 species

*P. melanonota*
Fawn-breasted Tanager

*Pipraeidae*
1 species

*P. bonariensis*
Blue-and-yellow Tanager

*Dubusia*
3 species

*D. taeniata*
Buff-breasted Mountain Tanager

*Tephrophilus*
1 species

*T. wetmorei*
Masked Mountain Tanager

*Sporathraupis*
1 species

*S. cyanocephala*
Blue-capped Tanager

*Anisognathus*
6 species

*A. somptuosus*
Blue-winged Mountain Tanager

*Buthraupis*
1 species

*B. montana*
Hooded Mountain Tanager

*Chlorornis*
1 species

*C. riefferii*
Grass-green Tanager

*Cnemathraupis*
2 species

*C. aureodorsalis*
Golden-backed Mountain Tanager

*Wetmorethraupis*
1 species

*W. sterrhopteron*
Orange-throated Tanager

*Bangsia*
5 species

*B. melanochlamys*
Black-and-gold Tanager

*Tangara*
56 species

*T. chilensis*
Paradise Tanager

# Literature cited


**Aggerbeck, M., Fjeldså, J., Christidis, L., Fabre, P.H. & Jønsson, K.A.** (2014). Resolving deep lineage divergences in core corvoid passerine birds supports a proto-Papuan island origin. *Molecular Phylogenetics and Evolution* **70**: 272–285.

**Aidala, Z., Chong, N., Anderson, M.G., Ortiz-Catedral, L., Jamieson, I.G., Briskie, J.V., Cassey, P., Gill, B.J. & Hauber, M.E.** (2013). Phylogenetic relationships of the genus *Mohoua*, endemic hosts of New Zealand's obligate brood parasitic Long-tailed Cuckoo (*Eudynamys taitensis*). *Journal of Ornithology* **154(4)**: 1127–1133.

**Alström, P., Ericson, P.G., Olsson, U. & Sundberg, P.** (2006). Phylogeny and classification of the avian superfamily Sylvioidea. *Molecular Phylogenetics and Evolution* **38(2)**: 381–397.

**Alström, P., Olsson, U., Lei, F., Wang, H.T., Gao, W. & Sundberg, P.** (2008). Phylogeny and classification of the Old World Emberizini (Aves, Passeriformes). *Molecular Phylogenetics and Evolution* **47(3)**: 960–973.

**Alström, P., Fjeldså, J., Fregin, S. & Olsson, U.** (2011a). Gross morphology betrays phylogeny: the Scrub Warbler *Scotocerca inquieta* is not a cisticolid. *Ibis* **153(1)**: 87–97.

**Alström, P., Fregin, S., Norman, J.A., Ericson, P.G., Christidis, L. & Olsson, U.** (2011b). Multilocus analysis of a taxonomically densely sampled dataset reveal extensive non-monophyly in the avian family Locustellidae. *Molecular Phylogenetics & Evolution* **58(3)**: 513–526.

**Alström, P., Olsson, U. & Lei, F.** (2013a). A review of the recent advances in the systematics of the avian superfamily Sylvioidea. *Chinese Birds* **4(2)**: 99–131.

**Alström, P., Barnes, K.N., Olsson, U., Barker, F.K., Bloomer, P., Khan, A.A., Qureshi, M.A., Guillaumet, A., Crochet, P.A. & Ryan, P.G.** (2013b). Multilocus phylogeny of the avian family Alaudidae (larks) reveals complex morphological evolution, non-monophyletic genera and hidden species diversity. *Molecular Phylogenetics and Evolution* **69(3)**: 1043–1056.

**Alström, P., Hooper, D.M., Liu, Y., Olsson, U., Mohan, D., Gelang, M., Le Manh, H., Zhao, J., Lei, F. & Price, T.D.** (2014). Discovery of a relict lineage and monotypic family of passerine birds. *Biology Letters* **10(3)**: 20131067.

**Alström, P., Jønsson, K.A., Fjeldså, J., Odeen, A., Ericson, P.G. & Irestedt, M.** (2015). Dramatic niche shifts and morphological change in two insular bird species. *Royal Society Open Science* **2(3)**: 140364.

**American Ornithologists' Union.** (1983). *Check-list of North American Birds*. 5th edition. American Ornithologists' Union, Baltimore, Maryland.

**American Ornithologists' Union.** (1998). *Check-list of North American Birds*. 7th edition. American Ornithologists' Union, Washington, D.C.

**Baker, A.J., Pereira, S.L., Haddrath, O.P. & Edge, K.A.** (2006). Multiple gene evidence for expansion of extant penguins out of Antarctica due to global cooling. *Proceedings of the Royal Society B: Biological Sciences* **273(1582)**: 11–17.

**Baker, A.J., Pereira, S.L. & Paton, T.A.** (2007a). Phylogenetic relationships and divergence times of Charadriiformes genera: multigene evidence for the Cretaceous origin of at least 14 clades of shorebirds. *Biology Letters* **3(2)**: 205–209.

**Baker, A.J., Pereira, S.L., Rogers, D.I., Elbourne, R. & Hassell, C.J.** (2007b). Mitochondrial-DNA evidence shows the Australian Painted Snipe is a full species, *Rostratula australis*. *Emu* **107(3)**: 185–189.

**Baker, A.J., Yatsenko, Y. & Tavares, E.S.** (2012). Eight independent nuclear genes support monophyly of the plovers: the role of mutational variance in gene trees. *Molecular Phylogenetics and Evolution* **65(2)**: 631–641.

**Barber, B.R. & Rice, N.H.** (2007). Systematics and evolution in the Tityrinae (Passeriformes: Tyrannoidea). *Auk* **124(4)**: 1317–1329.

**Barker, F.K.** (2004). Monophyly and relationships of wrens (Aves: Troglodytidae): a congruence analysis of heterogeneous mitochondrial and nuclear DNA sequence data. *Molecular Phylogenetics and Evolution* **31(2)**: 486–504.

**Barker, F.K.** (2014). Mitogenomic data resolve basal relationships among passeriform and passeridan birds. *Molecular Phylogenetics and Evolution* **79**: 313–324.

**Barker, F.K. & Lanyon, S.M.** (2000). The impact of parsimony weighting schemes on inferred relationships among toucans and neotropical barbets (Aves: piciformes). *Molecular Phylogenetics and Evolution* **15(2)**: 215–234.

**Barker, F.K., Cibois, A., Schikler, P., Feinstein, J. & Cracraft, J.** (2004). Phylogeny and diversification of the largest avian radiation. *Proceedings of the National Academy of Sciences* **101(30)**: 11040–11045.

**Barker, F.K., Burns, K.J., Klicka, J., Lanyon, S.M. & Lovette, I.J.** (2013). Going to extremes: contrasting rates of diversification in a recent radiation of new world passerine birds. *Systematic Biology* **62(2)**: 298–320.

**Barrowclough, G.F., Groth, J.G. & Mertz, L.A.** (2006). The RAG-1 exon in the avian order Caprimulgiformes: phylogeny, heterozygosity, and base composition. *Molecular Phylogenetics and Evolution* **41(1)**: 238–248.

**Benz, B.W., Robbins, M.B. & Peterson, A.T.** (2006). Evolutionary history of woodpeckers and allies (Aves: Picidae): placing key taxa on the phylogenetic tree. *Molecular Phylogenetics and Evolution* **40(2)**: 389–399.

**Beresford, P., Barker, F.K., Ryan, P.G. & Crowe, T.M.** (2005). African endemics span the tree of songbirds (Passeri): molecular systematics of several evolutionary 'enigmas'. *Proceedings of the Royal Society B: Biological Sciences* **272(1565)**: 849–858.

**Bertelli, S. & Giannini, N.P.** (2005). A phylogeny of extant penguins (Aves: Sphenisciformes) combining morphology and mitochondrial sequences. *Cladistics* **21(3)**: 209–239.

**Berv, J.S. & Prum, R.O.** (2014). A comprehensive multilocus phylogeny of the neotropical cotingas (Cotingidae, Aves) with a comparative evolutionary analysis of breeding system and plumage dimorphism and a revised phylogenetic classification. *Molecular Phylogenetics and Evolution* **81**: 120–136.

**Block, N.L.** (2012). *Cryptic diversity and phylogeography in the Bernieridae, an endemic Malagasy passerine radiation.* Unpublished Ph.D. Dissertation, University of Chicago, Chicago, Illinois, USA.

**Bonaccorso, E. & Peterson, A.T.** (2007). A multilocus phylogeny of New World jay genera. *Molecular Phylogenetics and Evolution* **42(2)**: 467–476.

**Bonaccorso, E., Peterson, A.T., Navarro-Siguenza, A.G. & Fleischer, R.C.** (2010). Molecular systematics and evolution of the *Cyanocorax* jays. *Molecular Phylogenetics and Evolution* **54(3)**: 897–909.

**Bonilla, A.J., Braun, E.L. & Kimball, R.T.** (2010). Comparative molecular evolution and phylogenetic utility of 3'-UTRs and introns in Galliformes. *Molecular Phylogenetics and Evolution* **56(2)**: 536–542.

**Braun, M.J. & Huddleston, C.J.** (2009). A molecular phylogenetic survey of caprimulgiform nightbirds illustrates the utility of non-coding sequences. *Molecular Phylogenetics and Evolution* **53(3)**: 948–960.

**Bridge, E.S., Jones, A.W. & Baker, A.J.** (2005). A phylogenetic framework for the terns (Sternini) inferred from mtDNA sequences: implications for taxonomy and plumage evolution. *Molecular Phylogenetics and Evolution* **35(2)**: 459–469.

**Burle, M.H., Rico-Guevara, A, Rubega, M.A. & Lank, D.** (2013). A hummingbird tongue in a shorebird head: Tuamoto sandpipers are nectar-feeders. Abstract for the Society for Integrative and Comparative Biology Annual Meeting. Unpublished.

**Burns, K.J.** (1997). Molecular systematics of tanagers (Thraupinae): evolution and biogeography of a diverse radiation of neotropical birds. *Molecular Phylogenetics and Evolution* **8(3)**: 334–348.

**Burns, K.J., Shultz, A.J., Title, P.O., Mason, N.A., Barker, F.K., Klicka, J., Lanyon, S.M., Lovette, I.J.** (2014). Phylogenetics and diversification of tanagers (Passeriformes: Thraupidae), the largest radiation of Neotropical songbirds. *Molecular Phylogenetics and Evolution* **75**: 41–77.

**Chesser, R.T.** (2004). Molecular systematics of New World suboscine birds. *Molecular Phylogenetics and Evolution* **32(1)**: 11–24.

**Chesser, R.T. & Have, J.T.** (2007). On the phylogenetic position of the scrub-birds (Passeriformes: Menurae: Atrichornithidae) of Australia. *Journal of Ornithology* **148(4)**: 471–476.

**Chesser, R.T., Banks, R.C., Barker, F.K., Cicero, C., Dunn, J.L., Kratter, A.W., Lovette, I.J., Rasmussen, P.C., Remsen, J.V., Rising, J.V., Stotz, D.F. & Winker, K.** (2010). Fifty-first supplement to the American Ornithologists' Union check-list of North American birds. *Auk* **127(3)**: 726–744.

**Christidis, L. & Boles, W.E.** (2008). *Systematics and Taxonomy of Australian Birds.* CSIRO Publishing, Melbourne.

**Christidis, L., Schodde, R., Shaw, D.D. & Maynes, S.F.** (1991). Relationships among the Australo-Papuan parrots, lorikeets, and cockatoos (Aves: Psittaciformes): Protein evidence. *The Condor* **93(2)**: 302–317.

**Chu, P.C., Eisenschenk, S.K. & Zhu, S.-T.** (2009). Skeletal morphology and the phylogeny of skuas (Aves: Charadriiformes, Stercorariidae). *Zoological Journal of the Linnean Society* **157(3)**: 612–621.

**Cibois, A.** (2003). Mitochondrial DNA phylogeny of babblers (Timaliidae). *Auk* **120(1)**: 35–54.

**Cibois, A. & Cracraft, J.** (2004). Assessing the passerine "Tapestry": phylogenetic relationships of the Muscicapoidea inferred from nuclear DNA sequences. *Molecular Phylogenetics and Evolution* **32(1)**: 264–273.

**Cibois, A., Slikas, B., Schulenberg, T.S. & Pasquet, E.** (2001). An endemic radiation of Malagasy songbirds is revealed by mitochondrial DNA sequence data. *Evolution* **55(6)**: 1198–1206.

**Clements, J.F.** (2007). *The Clements Checklist of Birds of the World.* 6th edition. Cornell University Press, Ithaca, New York.

**Clements, J.F., Schulenberg, T.S., Iliff, M.J., Roberson, D., Fredericks, T.A., Sullivan, B.L. & Wood, C.L.** (2014). The eBird/Clements checklist of birds of the world: v**2014**. Downloaded from http://www.birds.cornell.edu/clementschecklist/download/

**Cohen, B.L., Baker, A.J., Blechschmidt, K., Dittmann, D.L., Furness, H.D., Gerwin, J.A., Helbig, A.J., De Korte, J., Marshall, H.D., Palma, R.L., Peter, H.-U., Ramli, R., Siebold, I., Willcox, M.S., Wilson, R.H. & Zink, R.M.** (1997). Enigmatic phylogeny of skuas (Aves: Stercorariidae). *Proceedings of the Royal Society B: Biological Sciences* **264(1379)**: 181–190.

**Cohen, C., Wakeling, J.L., Mandiwana-Neudani, T.G., Sande, E., Dranzoa, C., Crowe, T.M. & Bowie, R.C.** (2012). Phylogenetic affinities of evolutionarily enigmatic African Galliforms: the Stone Partridge *Ptilopachus petrosus* and Nahan's Francolin *Francolinus nahani*, and support for their sister relationship with New World quails. *Ibis* **154(4)**: 768–780.

**Corbett, L. & Hertog, A.L.** (1996). An experimental study of the impact of feral swamp buffalo *Bubalus bubalis* on the breeding habitat and breeding success of Magpie Geese *Anseranas semipalmata* in Kakadu National Park. *Biological Conservation* **76**: 277–287.

**Cox, W.A., Kimball, R.T. & Braun, E.L.** (2007). Phylogenetic position of the New World quail (Odontophoridae): eight nuclear loci and three mitochondrial regions contradict morphology and the Sibley-Ahlquist tapestry. *Auk* **124(1)**: 71–84.

**Cracraft, J.** (1971). The relationships and evolution of the rollers: families Coraciidae, Brachypteraciidae, and Leptosomatidae. *Auk* **88(4)**: 723–752.

**Cracraft, J.** (1974). Phylogeny and evolution of the ratite birds. *Ibis* **116(4)**: 494–521.

**Cracraft, J.** (1981). Toward a phylogenetic classification of the recent birds of the world (Class Aves). *Auk* **98(4)**: 681–714.

**Cracraft, J.** (2013) Avian higher-level relationships and classification: Nonpasseriformes. Pp. xxi-xliii in Dickinson, E.C. & Remsen, J.V. eds. (2013). *The Howard and Moore Complete Checklist of the Birds of the World.* 4th edition. Volume 1: Non-Passerines. Aves Press, Eastbourne, UK.

**Cracraft, J.** (2014). Avian Higher-level Relationships and Classification: Passeriforms. Pp. xvii–xlv in: Dickinson, E.C. & Christidis, L. eds. (2014). *The Howard and Moore Complete Checklist of the Birds of the World.* 4th edition, Volume 2: Passerines. Aves Press, Eastbourne, UK.

**Cracraft, J. & Feinstein, J.** (2000). What is not a bird of paradise? Molecular and morphological evidence places *Macgregoria* in the Meliphagidae and the Cnemophilinae near the base of the corvoid tree. *Proceedings of the Royal Society B: Biological Sciences* **267(1440)**: 233–241.

**Crowe, T.M., Bloomer, P., Randi, E., Lucchini, V., Kimball, R., Braun, E. & Groth, J.G.** (2006). S20-1 Suprageneric cladistics of landfowl (Order Galliformes). *Acta Zoologica Sinica*: **52**: 358–361.

**DaCosta, J.M., Spellman, G.M., Escalante, P. & Klicka, J.** (2009). A molecular systematic revision of two historically problematic songbird clades: *Aimophila* and *Pipilo*. *Journal of Avian Biology* **40(2)**: 206–216.

**Derryberry, E.P., Claramunt, S., Derryberry, G., Chesser, R.T., Cracraft, J., Aleixo, A., Perez-Eman, J., Remsen, J.V. & Brumfield, R.T.** (2011). Lineage diversification and morphological evolution in a large-scale continental radiation: the neotropical ovenbirds and woodcreepers (aves: Furnariidae). *Evolution* **65(10)**: 2973–2986.

**Dickinson, E.C.** ed. (2003). *The Howard and Moore Complete Checklist of the Birds of the World.* Princeton University Press, Princeton.

**Dickinson, E.C. & Remsen, J.V.** eds. (2013). *The Howard and Moore Complete Checklist of the Birds of the World.* 4th edition. Volume 1: Non-passerines. Aves Press, Eastbourne, UK.

**Dimcheff, D.E., Drovetski, S.V. & Mindell, D.P.** (2002). Phylogeny of Tetraoninae and other galliform birds using mitochondrial 12S and ND2 genes. *Molecular Phylogenetics and Evolution* **24(2)**: 203–215.

**Donne-Goussé, C., Laudet, V. & Hänni, C.** (2002). A molecular phylogeny of Anseriformes based on mitochondrial DNA analysis. *Molecular Phylogenetics and Evolution* **23(3)**: 339–356.

**Downs, C.T., Wirminghaus, J.O. & Lawes, M.J.** (2000). Anatomical and nutritional adaptations of the Speckled Mousebird (*Colius striatus*). *Auk* **117(3)**: 791.

**Driskell, A.C. & Christidis, L.** (2004). Phylogeny and evolution of the Australo-Papuan honeyeaters (Passeriformes, Meliphagidae). *Molecular Phylogenetics and Evolution* **31(3)**: 943–960.

**Driskell, A., Christidis, L., Gill, B.J., Boles, W.E., Barker, F.K. & Longmore, N.W.** (2007). A new endemic family of New Zealand passerine birds: adding heat to a biodiversity hotspot. *Australian Journal of Zoology* **55(2)**: 73–78.

**Dumbacher, J.P., Deiner, K., Thompson, L. & Fleischer, R.C.** (2008). Phylogeny of the avian genus *Pitohui* and the evolution of toxicity in birds. *Molecular Phylogenetics and Evolution* **49(3)**: 774–781.

**Dyke, G.J., Gulas, B.E. & Crowe, T.M.** (2003). Suprageneric relationships of galliform birds (Aves, Galliformes): a cladistic analysis of morphological characters. *Zoological Journal of the Linnean Society* **137(2)**: 227–244.

**Eo, S.H., Bininda-Emonds, O.R.P. & Carroll, J.P.** (2009). A phylogenetic supertree of the fowls (Galloanserae, Aves). *Zoologica Scripta* **38(5)**: 465–481.

**Ericson, P.G. & Johansson, U.S.** (2003). Phylogeny of Passerida (Aves: Passeriformes) based on nuclear and mitochondrial sequence data. *Molecular Phylogenetics and Evolution* **29(1)**: 126–138.

**Ericson, P.G., Envall, I., Irestedt, M. & Norman, J.A.** (2003a). Inter-familial relationships of the shorebirds (Aves: Charadriiformes) based on nuclear DNA sequence data. *BMC Evolutionary Biology* **3(1)**: 16.

**Ericson, P.G., Irestedt, M. & Johansson, U.S.** (2003b). Evolution, biogeography, and patterns of diversification in passerine birds. *Journal of Avian Biology* **34(1)**: 3–15. http://www.jstor.org/stable/3677635

**Ericson, P.G., Jansén, A.L., Johansson, U.S. & Ekman, J.** (2005). Inter-generic relationships of the crows, jays, magpies and allied groups (Aves: Corvidae) based on nucleotide sequence data. *Journal of Avian Biology* **36(3)**: 222–234.

**Ericson, P.G., Anderson, C.L., Britton, T., Elzanowski, A., Johansson, U.S., Kallersjo, M., Ohlson, J.I., Parsons, T.J., Zuccon, D. & Mayr, G.** (2006a). Diversification of Neoaves: integration of molecular sequence data and fossils. *Biology Letters* **2(4)**: 543–547.

**Ericson, P.G., Zuccon, D., Ohlson, J.I., Johansson, U.S., Alvarenga, H. & Prum, R.O.** (2006b). Higher-level phylogeny and morphological evolution of tyrant flycatchers, cotingas, manakins, and their allies (Aves: Tyrannida). *Molecular Phylogenetics and Evolution* **40(2)**: 471–483.

**Ericson, P.G.P., Olson, S.L., Irestedt, M., Alvarenga, H. & Fjeldså, J.** (2009). Circumscription of a monophyletic family for the tapaculos (Aves: Rhinocryptidae): *Psiloramphus* in and *Melanopareia* out. *Journal of Ornithology* **151(2)**: 337–345.

**Ewen, J.G., Flux, I. & Ericson, P.G.** (2006). Systematic affinities of two enigmatic New Zealand passerines of high conservation priority, the Hihi or Stitchbird *Notiomystis cincta* and the Kokako *Callaeas cinerea*. *Molecular Phylogenetics and Evolution* **40(1)**: 281–284.

**Fain, M.G. & Houde, P.** (2004). Parallel radiations in the primary clades of birds. *Evolution* **58(11)**: 2558–2573.

**Fain, M.G. & Houde, P.** (2007). Multilocus perspectives on the monophyly and phylogeny of the order Charadriiformes (Aves). *BMC Evolutionary Biology* **7**: 35.

**Fain, M.G., Krajewski, C. & Houde, P.** (2007). Phylogeny of "core Gruiformes" (Aves: Grues) and resolution of the Limpkin-Sungrebe problem. *Molecular Phylogenetics and Evolution* **43(2)**: 515–529.

**Feduccia, A.** (1976) Osteological evidence for the shorebird affinities of the flamingos. *Auk* **93(3)**: 587–601.

**Fjeldså, J. & Bowie, R.C.** (2008). New perspectives on the origin and diversification of Africa's forest avifauna. *African Journal of Ecology* **46(3)**: 235–247.

**Fjeldså, J., Zuccon, D., Irestedt, M., Johansson, U.S. & Ericson, P.G.** (2003). *Sapayoa aenigma*: a New World representative of 'Old World suboscines'. *Proceedings of the Royal Society B: Biological Sciences* **270** (Suppl. 2): S238–241.

**Fjeldså, J., Irestedt, M., Ericson, P.G.P. & Zuccon, D.** (2010). The Cinnamon Ibon *Hypocryptadius cinnamomeus* is a forest canopy sparrow. *Ibis* **152(4)**: 747–760.

**Fleischer, R.C., James, H.F. & Olson, S.L.** (2008). Convergent evolution of Hawaiian and Australo-Pacific honeyeaters from distant songbird ancestors. *Current Biology* **18(24)**: 1927–1931.

**Forbes, W.A.** (1882). Report on the Anatomy of the Petrels collected by H.M.S. Challenger during the Years 1873–1876. *H.M.S. Challenger Reports, Zoology* **4**; 64 pp.

**Fregin, S., Haase, M., Olsson, U. & Alström, P.** (2009). Multi-locus phylogeny of the family Acrocephalidae (Aves: Passeriformes)–the traditional taxonomy overthrown. *Molecular Phylogenetics and Evolution* **52(3)**: 866–878.

**Fregin, S., Haase, M., Olsson, U. & Alström, P.** (2012). New insights into family relationships within the avian superfamily Sylvioidea (Passeriformes) based on seven molecular markers. *BMC Evolutionary Biology* **12(1)**: 157.

**Friesen, V.L., Baker, A.J. & Piatt, J.F.** (1996). Phylogenetic relationships within the Alcidae (Charadriiformes: Aves) inferred from total molecular evidence. *Molecular Biology and Evolution* **13(2)**: 359–367.

**Frith, H.J. & Davies, S.J.J.F.** (1961). Ecology of the magpie goose, *Anseranas semipalmata* Latham (Anatidae). *Wildlife Resources* **6(2)**: 91–141.

**Fuchs, J., Bowie, R.C., Fjeldså, J. & Pasquet, E.** (2004). Phylogenetic relationships of the African bush shrikes and helmet shrikes (Passeriformes: Malaconotidae). *Molecular Phylogenetics and Evolution* **33(2)**: 428–439.

**Fuchs, J., Ohlson, J.I., Ericson, P.G.P. & Pasquet, E.** (2006a). Molecular phylogeny and biogeographic history of the piculets (Piciformes: Picumninae). *Journal of Avian Biology* **37(5)**: 487–496.

**Fuchs, J., Fjeldså, J., Bowie, R.C., Voelker, G. & Pasquet, E.** (2006b). The African warbler genus *Hyliota* as a lost lineage in the oscine songbird tree: molecular support for an African origin of the Passerida. *Molecular Phylogenetics and Evolution* **39(1)**: 186–197.

**Fuchs, J., Fjeldså, J. & Pasquet, E.** (2006c). An ancient African radiation of corvoid birds (Aves: Passeriformes) detected by mitochondrial and nuclear sequence data. *Zoologica Scripta* **35(4)**: 375–385.

**Fuchs, J., Ohlson, J.I., Ericson, P.G.P. & Pasquet, E.** (2007a). Synchronous intercontinental splits between assemblages of woodpeckers suggested by molecular data. *Zoologica Scripta* **36(1)**: 11–25.

**Fuchs, J., Cruaud, C., Couloux, A. & Pasquet, E.** (2007b). Complex biogeographic history of the cuckooshrikes and allies (Passeriformes: Campephagidae) revealed by mitochondrial and nuclear sequence data. *Molecular Phylogenetics and Evolution* **44(1)**: 138–153.

**Fuchs, J., Pasquet, E., Couloux, A., Fjeldså, J. & Bowie, R.C.** (2009). A new Indo-Malayan member of the Stenostiridae (Aves: Passeriformes) revealed by multilocus sequence data: biogeographical implications for a morphologically diverse clade of flycatchers. *Molecular Phylogenetics and Evolution* **53(2)**: 384–393.

**Fuchs, J., Irestedt, M., Fjeldså, J., Couloux, A., Pasquet, E. & Bowie, R.C.** (2012). Molecular phylogeny of African bush shrikes and allies: tracing the biogeographic history of an explosive radiation of corvoid birds. *Molecular Phylogenetics and Evolution* **64(1)**: 93–105.

**Garcia-R, J.C., Gibb, G.C. & Trewick, S.A.** (2014). Deep global evolutionary radiation in birds: diversification and trait evolution in the cosmopolitan bird family Rallidae. *Molecular Phylogenetics and Evolution* **81**: 96–108.

**Gardner, J.L., Trueman, J.W., Ebert, D., Joseph, L. & Magrath, R.D.** (2010). Phylogeny and evolution of the Meliphagoidea, the largest radiation of Australasian songbirds. *Molecular Phylogenetics and Evolution* **55(3)**: 1087–1102.

**Gebauer, A., Kaiser, M. & Wassmann, C.** (2006). Remarks on biology, vocalisations and systematics of *Urocynchramus pylzowi* Przewalski (Aves, Passeriformes). *Zootaxa* **1325**: 75–98.

**Gelang, M., Cibois, A., Pasquet, E., Olsson, U., Alström, P. & Ericson, P.G.P.** (2009). Phylogeny of babblers (Aves, Passeriformes): major lineages, family limits and classification. *Zoologica Scripta* **38(3)**: 225–236.

**Gibb, G.C., Kennedy, M. & Penny, D.** (2013). Beyond phylogeny: pelecaniform and ciconiiform birds, and long-term niche stability. *Molecular Phylogenetics and Evolution* **68(2)**: 229–238.

**Gibson, R.** (2010). *Phylogenetic relationships among the Scolopaci (Aves: Charadriiformes): Implications for the study of behavioural evolution* . Unpublished Ph.D. Dissertation. University of Toronto, Toronto, ON, Canada.

**Gibson, R. & Baker, A.** (2012). Multiple gene sequences resolve phylogenetic relationships in the shorebird suborder Scolopaci (Aves: Charadriiformes). *Molecular Phylogenetics and Evolution* **64(1)**: 66–72.

**Gill, F. & Donsker, D.** eds. (2014). IOC World Bird List. Version 4.4. doi: 10.14344/IOC.ML.5.2.

**Gill, F.B., Slikas, B. & Sheldon, F.H.** (2005). Phylogeny of titmice (Paridae): II. Species relationships based on sequences of the mitochondrial cytochrome-b gene. *Auk* **122(1)**: 121–143.

**Gill, F., Wright, M. & Donsker, D.** (2009). IOC World Bird Names. Version 2.1.

**Godoy-Vitorino, F., Ley, R.E., Gao, Z., Pei, Z., Ortiz-Zuazaga, H., Pericchi, L.R., Garcia-Amado, M.A., Michelangeli, F., Blaser, M.J., Gordon, J.I. & Domínguez-Bello, M.G.** (2008). Bacterial community in the crop of the hoatzin, a neotropical folivorous flying bird. *Applied and Environmental Microbiology* **74(19)**: 5905–5912.

**Gonzalez, J., Düttmann, H. & Wink, M.** (2009). Phylogenetic relationships based on two mitochondrial genes and hybridization patterns in Anatidae. *Journal of Zoology* **279(3)**: 310–318.

**Griffiths, C.S., Barrowclough, G.F., Groth, J.G. & Mertz, L.** (2004). Phylogeny of the Falconidae (Aves): a comparison of the efficacy of morphological, mitochondrial, and nuclear data. *Molecular Phylogenetics and Evolution* **32(1)**: 101–109.

**Griffiths, C.S., Barrowclough, G.F., Groth, J.G. & Mertz, L.A.** (2007). Phylogeny, diversity, and classification of the Accipitridae based on DNA sequences of the RAG-1 exon. *Journal of Avian Biology* **38(5)**: 587–602.

**Groth, J.G.** (2000). Molecular evidence for the systematic position of *Urocynchramus pylzowi*. *Auk* **117(3)**: 787–791.

**Hackett, S.J., Kimball, R.T., Reddy, S., Bowie, R.C., Braun, E.L., Braun, M.J., Chojnowski, J.L., Cox, W.A., Han, K.L., Harshman, J., Huddleston, C.J., Marks, B.D., Miglia, K.J., Moore, W.S., Sheldon, F.H., Steadman, D.W., Witt, C.C. & Yuri, T.** (2008). A phylogenomic study of birds reveals their evolutionary history. *Science* **320(5884)**: 1763–1768.

**Han, K.L.** (2006). *Molecular systematics of nightjars and nighthawks (Caprimulgidae)* Unpublished Ph.D. Dissertation, University of Florida, Gainesville, Florida, USA.

**Han, K.L., Robbins, M.B. & Braun, M.J.** (2010). A multigene estimate of phylogeny in the nightjars and nighthawks (Caprimulgidae). *Molecular Phylogenetics and Evolution* **55(2)**: 443–453.

**Harrap, S. & Quinn, D.** (1995). *Chickadees, Tits, Nuthatches and Treecreepers*. Princeton University Press, Princeton, New Jersey.

**Harshman, J., Braun, E.L., Braun, M.J., Huddleston, C.J., Bowie, R.C., Chojnowski, J.L., Hackett, S.J., Han, K.L.,**

**Kimball, R.T., Marks, B.D., Miglia, K.J., Moore, W.S., Reddy, S., Sheldon, F.H., Steadman, D.W., Steppan, S.J., Witt, C.C. & Yuri, T.** (2008). Phylogenomic evidence for multiple losses of flight in ratite birds. *Proceedings of the National Academy of Sciences* **105**(36): 13462–13467.

**Hedges, S.B. & Sibley, C.G.** (1994). Molecules vs. morphology in avian evolution: The case of the "pelecaniform" birds. *Proceedings of the National Academy of Sciences* **91(21)**: 9861–9865.

**Hedges, S.B., Simmons, M.D., Van Dijk, M.A., Caspers, G.J., de Jong, W.W. & Sibley, C.G.** (1995). Phylogenetic relationships of the Hoatzin, an enigmatic South American bird. *Proceedings of the National Academy of Sciences* **92(25)**: 11662–11665.

**Houde, P.** (1994). Evolution of the Heliornithidae: Reciprocal illumination by morphology, biogeography and DNA hybridization (Aves: Gruiformes). *Cladistics* **10(1)**: 1–19.

**del Hoyo, J., Elliott, A. & Sargatal, J.** eds. (1994). *Handbook of the Birds of the World.* Vol. 2: New World Vultures to Guineafowl. Lynx Edicions, Barcelona.

**del Hoyo, J. & Collar, N.J.** (2014). *HBW and BirdLife International Illustrated Checklist of the Birds of the World.* Volume 1: Non-passerines. Lynx Edicions, Barcelona.

**Hruska, J., Dzielski, S., VanDoren, B. & Hite, J.M.** (2015). Report on Ivy Expedition to Darien, Panama, to study the breeding biology of Sapayoa aenigma. pers. comm.

**Hughes, J.M. & Baker, A.J.** (1999). Phylogenetic relationships of the enigmatic Hoatzin (*Opisthocomus hoazin*) resolved using mitochondrial and nuclear gene sequences. *Molecular Biology and Evolution* **16(9)**: 1300–1307.

**Irestedt, M. & Ohlson, J.I.** (2008). The division of the major songbird radiation into Passerida and 'core Corvoidea' (Aves: Passeriformes) — the species tree vs. gene trees. *Zoologica Scripta* **37(3)**: 305–313.

**Irestedt, M., Johansson, U.S., Parsons, T.J. & Ericson, P.G.** (2001). Phylogeny of major lineages of suboscines (Passeriformes) analysed by nuclear DNA sequence data. *Journal of Avian Biology* **32(1)**: 15–25.

**Irestedt, M., Fjeldså, J., Nylander, J.A. & Ericson, P.G.** (2004). Phylogenetic relationships of typical antbirds (Thamnophilidae) and test of incongruence based on Bayes factors. *BMC Evolutionary Biology* **4**: 23.

**Irestedt, M., Ohlson, J.I., Zuccon, D., Källersjö, M. & Ericson, P.G.P.** (2006a). Nuclear DNA from old collections of avian study skins reveals the evolutionary history of the Old World suboscines (Aves, Passeriformes). *Zoologica Scripta* **35(6)**: 567–580.

**Irestedt, M., Fjeldså, J. & Ericson, P.G.P.** (2006b). Evolution of the ovenbird-woodcreeper assemblage (Aves: Furnariidae) - major shifts in nest architecture and adaptive radiation. *Journal of Avian Biology* **37(3)**: 260–272.

**Irestedt, M., Fuchs, J., Jønsson, K.A., Ohlson, J.I., Pasquet, E. & Ericson, P.G.** (2008). The systematic affinity of the enigmatic *Lamprolia victoriae* (Aves: Passeriformes)--an example of avian dispersal between New Guinea and Fiji over Miocene intermittent land bridges? *Molecular Phylogenetics and Evolution* **48(3)**: 1218–1222.

**Irestedt, M., Fjeldså, J., Dalen, L. & Ericson, P.G.** (2009a). Convergent evolution, habitat shifts and variable diversification rates in the ovenbird-woodcreeper family (Furnariidae). *BMC Evolutionary Biology* **9**: 268.

**Irestedt, M., Jønsson, K.A., Fjeldså, J., Christidis, L. & Ericson, P.G.** (2009b). An unexpectedly long history of sexual selection in birds-of-paradise. *BMC Evolutionary Biology* **9**: 235.

**Irestedt, M., Gelang, M., Sangster, G., Olsson, U., Ericson, P.G. & Alström, P.** (2011). Neumann's Warbler *Hemitesia neumanni* (Sylvioidea): the sole African member of a Palaeotropic Miocene avifauna. *Ibis* **153(1)**: 78–86.

**James, H.F.** (2004). The osteology and phylogeny of the Hawaiian finch radiation (Fringillidae: Drepanidini), including extinct taxa. *Zoological Journal of the Linnean Society* **141(2)**: 207–255.

**James, H.F., Ericson, P.G.P., Slikas, B., Lei, F.-M., Gill, F.B. & Olson, S.L.** (2003). *Pseudopodoces humilis*, a misclassified terrestrial tit (Paridae) of the Tibetan Plateau: evolutionary consequences of shifting adaptive zones. *Ibis* **145(2)**: 185–202.

**Jarvis, E.D., Mirarab, S., Aberer, A.J., Li, B., Houde, P., Li, C. Ho, S.Y.W., Faircloth, B.C., Nabholz, B., Howard, J.T., Suh, A., Weber, C.C., de Fonseca, R.R., Li, J., Zhang, F., Li, H., Zhou, L., Narula, N., Liu, L., Ganapathy, G., Boussau, B., Bayzid, S., Zavidovych, V., Subramanian, S., Gabaldón, T., Capella-Gutiérrez, S, Huerta-Cepas, J., Rekeplli, B., Munch, K., Schierup, M., Lindow, B., Warren, W.C., Ray, D., Green, R.E., Bruford, M.W., Zhan, X., Dixon, A., Li, S., Li, N., Huang, Y., Derryberry, E.P., Bertelsen, M.F., Sheldon, F.H., Brumfield, R.T., Mello, C.V., Lovell, P.V., Wirthlin, M., Schneider, M.P.C., Prosdocimi, F., Samaniego, J.A., Velazquez, A.M.V., Alfaro-Núñez, A., Campos, P.F., Petersen, B., Sicheritz-Ponten, T., Pas, A., Bailey, T., Scofield, P., Bunce, M., Lambert, D.M., Zhou, Q., Perelman, P., Driskell, A.C., Shapiro, B., Xiong, Z., Zeng, Y., Liu, S., Li, Z., Liu, B., Wu, K., Xiao, J., Yinqi, X., Zheng, Q., Zhang, Y., Yang, H., Wang, J., Smeds, L., Rheindt, F.E., Braun, M., Fjeldså, J., Orlando, L., Barker, K.F., Jønsson, K.A., Johnson, W., Koepfli, K.-P., O'Brien, S., Haussler, D., Ryder, O.A., Rahbek, C., Willerslev, E., Graves, G.R., Glenn, T.C., McCormack, J., Burt, D., Ellegren, H., Alström, P., Edwards, S.V., Stamatakis, A., Mindell, D.P., Cracraft, J., Braun, E.L., Warnow, T., Jun, W., Gilbert, M.T.P. & Zhang, G.** (2014). Whole-genome analyses resolve early branches in the tree of life of modern birds. *Science* **346(6215)**: 1320–1331.

**Johansson, U.S. & Ericson, P.G.** (2003). Molecular support for a sister group relationship between Pici and Galbulae (Piciformes sensu Wetmore 1960). *Journal of Avian Biology* **34(2)**: 185–197.

**Johansson, U.S., Parsons, T.J., Irestedt, M. & Ericson, P.G.P.** (2001). Clades within the higher land birds', evaluated by nuclear DNA sequences. *Journal of Zoological Systematics and Evolutionary Research* **39(1/2)**: 37–52.

**Johansson, U.S., Bowie, R.C., Hackett, S.J. & Schulenberg, T.S.** (2008a). The phylogenetic affinities of Crossley's Babbler (*Mystacornis crossleyi*): adding a new niche to the vanga radiation of Madagascar. *Biology Letters* **4(6)**: 677–680.

**Johansson, U.S., Fjeldså, J. & Bowie, R.C.** (2008b). Phylogenetic relationships within Passerida (Aves: Passeriformes): a review and a new molecular phylogeny based on three nuclear intron markers. *Molecular Phylogenetics and Evolution* **48(3)**: 858–876.

**Johansson, U.S., Pasquet, E. & Irestedt, M.** (2011). The New Zealand Thrush: an extinct oriole. *PLoS One* **6(9)**: e24317.

**Jollie, M.** (1977). *A contribution to the morphology and phylogeny of the Falconiformes.* Unpublished Dissertation, University of Chicago, Chicago, IL USA.

**Jønsson, K.A., Fjeldså, J., Ericson, P.G. & Irestedt, M.** (2007). Systematic placement of an enigmatic Southeast Asian taxon *Eupetes macrocerus* and implications for the biogeography of a main songbird radiation, the Passerida. *Biology Letters* **3(3)**: 323–326.

**Jønsson, K.A., Bowie, R.C., Norman, J.A., Christidis, L. & Fjeldså, J.** (2008a). Polyphyletic origin of toxic Pitohui birds suggests widespread occurrence of toxicity in corvoid birds. *Biology Letters* **4(1)**: 71–74.

**Jønsson, K.A., Irestedt, M., Fuchs, J., Ericson, P.G., Christidis, L., Bowie, R.C., Norman, J.A., Pasquet, E. & Fjeldså, J.** (2008b). Explosive avian radiations and multi-directional dispersal across Wallacea: evidence from the Campephagidae and other Crown Corvida (Aves). *Molecular Phylogenetics and Evolution* **47(1)**: 221–236.

**Jønsson, K.A., Bowie, R.C.K., Moyle, R.G., Irestedt, M., Christidis, L., Norman, J.A. & Fjeldså, J.** (2010a). Phylogeny and biogeography of Oriolidae (Aves: Passeriformes). *Ecography* **33**: 232–241.

**Jønsson, K.A., Bowie, R.C.K., Moyle, R.G., Christidis, L., Norman, J.A., Benz, B.W. & Fjeldså, J.** (2010b). Historical biogeography of an Indo-Pacific passerine bird family (Pachycephalidae): different colonization patterns in the Indonesian and Melanesian archipelagos. *Journal of Biogeography* **37(2)**: 245–257.

**Jønsson, K.A., Fabre, P.H., Ricklefs, R.E. & Fjeldså, J.** (2011). Major global radiation of corvoid birds originated in the proto-Papuan archipelago. *Proceedings of the National Academy of Sciences* **108(6)**: 2328–2333.

**Jønsson, K.A., Fabre, P.H., Fritz, S.A., Etienne, R.S., Ricklefs, R.E., Jørgensen, T.B., Fjeldså, J., Rahbek, C., Ericson, P.G.P., Woog, F., Pasquet, E. & Irestedt, M.** (2012). Ecological and evolutionary determinants for the adaptive radiation of the Madagascan vangas. *Proceedings of the National Academy of Sciences* **109(17)**: 6620–6625.

**Joseph, L., Toon, A., Schirtzinger, E.E., Wright, T.F. & Schodde, R.** (2012). A revised nomenclature and classification for family-group taxa of parrots (Psittaciformes). *Zootaxa* **3205(2)**: 26–40.

**Joseph, L., Toon, A., Nyári, Á.S., Longmore, N.W., Rowe, K.M.C., Haryoko, T., Trueman, J. & Gardner, J.L.** (2014). A new synthesis of the molecular systematics and biogeography of honeyeaters (Passeriformes: Meliphagidae) highlights biogeographical and ecological complexity of a spectacular avian radiation. *Zoologica Scripta* **43(3)**: 235–248.

**Kennedy, M. & Page, R.D.** (2002). Seabird supertrees: combining partial estimates of procellariiform phylogeny. *Auk* **119(1)**: 88–108.

**Kennedy, M. & Spencer, H.G.** (2004). Phylogenies of the Frigatebirds (Fregatidae) and Tropicbirds (Phaethontidae), two divergent groups of the traditional order Pelecaniformes, inferred from mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution* **31(1)**: 31–38.

**Kiltie, R.A. & Fitzpatrick, J.W.** (1984). Reproduction and social organization of the Black-capped Donacobius (*Donacobius atricapillus*) in southeastern Peru. *Auk* **101(4)**: 804–811.

**Kimball, R.T. & Braun, E.L.** (2008). A multigene phylogeny of Galliformes supports a single origin of erectile ability in non-feathered facial traits. *Journal of Avian Biology* **39(4)**: 438–445.

**Kimball, R. T., Mary, C. M. & Braun, E. L.** (2011). A Macroevolutionary Perspective on Multiple Sexual Traits in the Phasianidae (Galliformes). *International Journal of Evolutionary Biology* **2011**. Article ID 423938; 16 pp.

**Kirchman, J.J., Hackett, S.J., Goodman, S.M. & Bates, J.M.** (2001). Phylogeny and systematics of ground rollers (Brachypteraciidae) of Madagascar. *Auk* **118(4)**: 849–863.

**Klicka, J., Zink, R.M. & Winker, K.** (2003). Longspurs and snow buntings: phylogeny and biogeography of a high-latitude clade (*Calcarius*). *Molecular Phylogenetics and Evolution* **26(2)**: 165–175.

**Klicka, J., Burns, K. & Spellman, G.M.** (2007). Defining a monophyletic Cardinalini: a molecular perspective. *Molecular Phylogenetics and Evolution* **45(3)**: 1014–1032.

**Klicka, J., Keith Barker, F., Burns, K.J., Lanyon, S.M., Lovette, I.J., Chaves, J.A. & Bryson, R.W., Jr.** (2014). A comprehensive multilocus assessment of sparrow (Aves: Passerellidae) relationships. *Molecular Phylogenetics and Evolution* **77**: 177–182.

**de Kloet, R.S. & de Kloet, S.R.** (2005). The evolution of the spindlin gene in birds: sequence analysis of an intron of the spindlin W and Z gene reveals four major divisions of the Psittaciformes. *Molecular Phylogenetics and Evolution* **36(3)**: 706–721.

**Krell, F.T. & Cranston, P.S.** (2004). Which side of the tree is more basal? *Systematic Entomology* **29(3)**: 279–281.

**Kriegs, J.O., Matzke, A., Churakov, G., Kuritzin, A., Mayr, G., Brosius, J. & Schmitz, J.** (2007). Waves of genomic hitchhikers shed light on the evolution of gamebirds (Aves: Galliformes). *BMC Evolutionary Biology* **7**: 190.

**Lanyon, S.M.** (1985). Molecular perspective on higher-level relationships in the Tyrannoidea (Aves). *Systematic Biology* **34(4)**: 404–418.

**Lee, J.Y., Joseph, L. & Edwards, S.V.** (2012). A species tree for the Australo-Papuan fairy-wrens and allies (Aves: Maluridae). *Systematic Biology* **61(2)**: 253–71.

**Lerner, H.R. & Mindell, D.P.** (2005). Phylogeny of eagles, Old World vultures, and other Accipitridae based on nuclear and mitochondrial DNA. *Molecular Phylogenetics and Evolution* **37(2)**: 327–346.

**Lerner, H.R., Meyer, M., James, H.F., Hofreiter, M. & Fleischer, R.C.** (2011). Multilocus resolution of phylogeny and timescale in the extant adaptive radiation of Hawaiian honeycreepers. *Current Biology* **21(21)**: 1838–1844.

**Livezey, B.C.** (2010a). Grebes and flamingos: standards of evidence, adjudication of disputes, and societal politics in avian systematics. *Cladistics* **27(4)**: 391–401.

**Livezey, B.C.** (2010b). Phylogenetics of modern shorebirds (Charadriiformes) based on phenotypic evidence: analysis and discussion. *Zoological Journal of the Linnean Society* **160(3)**: 567–618.

**Livezey, B.C. & Zusi, R.L.** (2001). Higher-order phylogenetics of modern Aves based on comparative anatomy. *Netherlands Journal of Zoology* **51(2)**: 179–205.

**Livezey, B.C. & Zusi, R.L.** (2007). Higher-order phylogeny of modern birds (Theropoda, Aves: Neornithes) based on comparative anatomy. II. Analysis and discussion. *Zoological Journal of the Linnean Society* **149(1)**: 1–95.

**Lovette, I.J. & Bermingham, E.** (2002). What is a wood-warbler? Molecular characterization of a monophyletic Parulidae. *Auk* **119(3)**: 695–714.

**Lovette, I.J. & Rubenstein, D.R.** (2007). A comprehensive molecular phylogeny of the starlings (Aves: Sturnidae) and mockingbirds (Aves: Mimidae): congruent mtDNA and nuclear trees for a cosmopolitan avian radiation. *Molecular Phylogenetics and Evolution* **44(3)**: 1031–1056.

**Lovette, I.J., Perez-Eman, J.L., Sullivan, J.P., Banks, R.C., Fiorentino, I., Cordoba-Cordoba, S., Echeverry-Galvis, M., Barker, F.K., Burns, K.J., Klicka, J., Lanyon, S.M. & Bermingham, E.** (2010). A comprehensive multilocus phylogeny for the wood-warblers and a revised classification of the Parulidae (Aves). *Molecular Phylogenetics and Evolution* **57(2)**: 753–770.

**Manegold, A.** (2008a). Composition and phylogenetic affinities of vangas (Vangidae, Oscines, Passeriformes) based on morphological characters. *Journal of Zoological Systematics and Evolutionary Research* **46(3)**: 267–277.

**Manegold, A.** (2008b). Morphological characters of the tongue skeleton reveal phylogenetic relationships within the Corvidae (Oscines, Passeriformes). *Emu* **108(4)**: 321–330.

**Marks, B.D., Weckstein, J.D. & Moyle, R.G.** (2007). Molecular phylogenetics of the bee-eaters (Aves: Meropidae) based on nuclear and mitochondrial DNA sequence data. *Molecular Phylogenetics and Evolution* **45(1)**: 23–32.

**Mayr, G.** (2000). Tiny hoopoe-like birds from the Middle Eocene of Messel (Germany). *Auk* **117(4)**: 964–970.

**Mayr, G.** (2003). The phylogenetic affinities of the Shoebill (*Balaeniceps rex*). *Journal für Ornithologie* **144(2)**: 157–175.

**Mayr, G.** (2004). Morphological evidence for sister group relationship between flamingos (Aves: Phoenicopteridae) and grebes (Podicipedidae). *Zoological Journal of the Linnean Society* **140(2)**: 157–169.

**Mayr, G.** (2007). Avian higher-level phylogeny: well-supported clades and what we can learn from a phylogenetic analysis of 2954 morphological characters. *Journal of Zoological Systematics and Evolutionary Research* **46(1)**: 63–72.

**Mayr, G.** (2008). The Madagascan "Cuckoo-Roller" (Aves: Leptosomidae) is not a roller — notes on the phylogenetic affinities and evolutionary history of a "living fossil". *Acta Ornithologica* **43(2)**: 226–230.

**Mayr, G.** (2009). Notes on the osteology and phylogenetic affinities of the Oligocene Diomedeoididae (Aves, Procellariiformes). *Fossil Record* **12(2)**: 133–140.

**Mayr, G.** (2010). Phylogenetic relationships of the paraphyletic 'caprimulgiform' birds (nightjars and allies). *Journal of Zoological Systematics and Evolutionary Research* **48(2)**: 126–137.

**Mayr, G.** (2011). Metaves, Mirandornithes, Strisores and other novelties - a critical review of the higher-level phylogeny of neornithine birds. *Journal of Zoological Systematics and Evolutionary Research* **49(1)**: 58–76.

**Mayr, G., Alvarenga, H. & Mourer-Chauvire, C.** (2011). Out of Africa: Fossils shed light on the origin of the Hoatzin, an iconic neotropic bird. *Naturwissenschaften* **98(11)**: 961–966.

**McCormack, J.E., Harvey, M.G., Faircloth, B.C., Crawford, N.G., Glenn, T.C. & Brumfield, R.T.** (2013). A phylogeny of birds based on over 1,500 loci collected by target enrichment and high-throughput sequencing. *PLoS One* **8(1)**: e54848.

**McCracken, K.G. & Sheldon, F.H.** (1998). Molecular and osteological heron phylogenies: sources of incongruence. *Auk* **115(1)**: 127–141.

**McGuire, J.A., Witt, C.C., Altshuler, D.L. & Remsen, J.V.** (2007). Phylogenetic systematics and biogeography of hummingbirds: Bayesian and maximum likelihood analyses of partitioned data and selection of an appropriate partitioning strategy. *Systematic Biology* **56(5)**: 837–856.

**McGuire, J.A., Witt, C.C., Remsen, J.V., Dudley, R. & Altshuler, D.L.** (2009). A higher-level taxonomy for hummingbirds. *Journal of Ornithology* **150**: 155–165.

**McKitrick, M.C.** (1985). Monophyly of the Tyrannidae (Aves): comparison of morphology and DNA. *Systematic Zoology* **34(1)**: 35–45.

**Moyle, R.G.** (2004). Phylogenetics of barbets (Aves: Piciformes) based on nuclear and mitochondrial DNA sequence data. *Molecular Phylogenetics and Evolution* **30(1)**: 187–200.

**Moyle, R.G.** (2006). A molecular phylogeny of kingfishers (Alcedinidae) with insights into early biogeographic history. *Auk* **123(2)**: 487–499.

**Moyle, R.G., Chesser, R.T., Prum, R.O., Schikler, P. & Cracraft, J.** (2006a). Phylogeny and evolutionary history of Old World suboscine birds (Aves: Eurylaimides). *American Museum Novitates* **3544**: 1–22.

**Moyle, R.G., Cracraft, J., Lakim, M., Nais, J. & Sheldon, F.H.** (2006b). Reconsideration of the phylogenetic relationships of the enigmatic Bornean Bristlehead (*Pityriasis gymnocephala*). *Molecular Phylogenetics and Evolution* **39(3)**: 893–898.

**Moyle, R.G., Chesser, R.T., Brumfield, R.T., Tello, J.G., Marchese, D.J. & Cracraft, J.** (2009). Phylogeny and phylogenetic classification of the antbirds, ovenbirds, woodcreepers, and allies (Aves: Passeriformes: infraorder Furnariides). *Cladistics* **25(4)**: 386–405.

**Moyle, R.G., Taylor, S.S., Oliveros, C.H., Lim, H.C., Haines, C.L., Rahman, M.A. & Sheldon, F.H.** (2011). Diversification of an endemic Southeast Asian genus: Phylogenetic relationships of the spiderhunters (Nectariniidae:*Arachnothera*). *Auk* **128(4)**: 777–788.

**Moyle, R.G., Andersen, M.J., Oliveros, C.H., Steinheimer, F.D. & Reddy, S.** (2012). Phylogeny and biogeography of the core babblers (Aves: Timaliidae). *Systematic Biology* **61(4)**: 631–651.

**Nguembock, B., Fjeldså, J., Tillier, A. & Pasquet, E.** (2007). A phylogeny for the Cisticolidae (Aves: Passeriformes) based on nuclear and mitochondrial DNA sequence data, and a re-interpretation of an unique nest-building specialization. *Molecular Phylogenetics and Evolution* **42(1)**: 272–286.

**Njabo, K.Y., Bowie, R.C. & Sorenson, M.D.** (2008). Phylogeny, biogeography and taxonomy of the African wattle-eyes (Aves: Passeriformes: Platysteiridae). *Molecular Phylogenetics and Evolution* **48(1)**: 136–149.

**Norman, J.A., Ericson, P.G., Jønsson, K.A., Fjeldså, J. & Christidis, L.** (2009). A multi-gene phylogeny reveals novel relationships for aberrant genera of Australo-Papuan core Corvoidea and polyphyly of the Pachycephalidae and Psophodidae (Aves: Passeriformes). *Molecular Phylogenetics and Evolution* **52(2)**: 488–497.

**Nyári, Á.S., Benz, B.W., Jønsson, K.A., Fjeldså, J. & Moyle, R.G.** (2009a). Phylogenetic relationships of fantails (Aves: Rhipiduridae). *Zoologica Scripta* **38(6)**: 553–561.

**Nyári, Á.S., Peterson, A.T., Rice, N.H. & Moyle, R.G.** (2009b). Phylogenetic relationships of flowerpeckers

(Aves: Dicaeidae): novel insights into the evolution of a tropical passerine clade. *Molecular Phylogenetics and Evolution* **53(3)**: 613–619.

**Nyári, Á.S. & Joseph, L.** (2012). Evolution in Australasian mangrove forests: multilocus phylogenetic analysis of the gerygone warblers (Aves: Acanthizidae). *PLoS One* **7(2)**: e31840.

**Ohlson, J.I., Prum, R.O. & Ericson, P.G.** (2007). A molecular phylogeny of the cotingas (Aves: Cotingidae). *Molecular Phylogenetics and Evolution* **42(1)**: 25–37.

**Ohlson, J.I., Irestedt, M., Fjeldså, J. & Ericson, P.G.** (2012). Nuclear DNA from a 180-year-old study skin reveals the phylogenetic position of the Kinglet Calyptura *Calyptura cristata* (Passeriformes: Tyrannides). *Ibis* **154(3)**: 533–541.

**Ohlson, J.I., Irestedt, M., Ericson, P.G. & Fjeldså, J.** (2013a). Phylogeny and classification of the New World suboscines (Aves, Passeriformes). *Zootaxa* **3613**: 1–35.

**Ohlson, J.I., Fjeldså, J. & Ericson, P.G.** (2013b). Molecular phylogeny of the manakins (Aves: Passeriformes: Pipridae), with a new classification and the description of a new genus. *Molecular Phylogenetics and Evolution* **69(3)**: 796–804.

**Olson, S.L.** (1983). Evidence for a polyphyletic origin of the Piciformes. *Auk* **100(1)**: 126–133.

**Olson, S.L. & Steadman, D.W.** (1981). *The Relationships of the Pedionomidae (Aves, Charadriiformes).* Smithsonian Institution Press.

**Olsson, U. & Alström, P.** (2013). Molecular evidence suggests that the enigmatic Sulawesi endemic *Geomalia heinrichi* belongs in the genus Zoothera (Turdidae, Aves). *Chinese Birds* **4(2)**: 155–160.

**Olsson, U., Irestedt, M., Sangster, G., Ericson, P.G. & Alström, P.** (2013). Systematic revision of the avian family Cisticolidae based on a multi-locus phylogeny of all genera. *Molecular Phylogenetics and Evolution* **66(3)**: 790–799.

**Outlaw, D.C. & Voelker, G.** (2006a). Systematics of *Ficedula* flycatchers (Muscicapidae): a molecular reassessment of a taxonomic enigma. *Molecular Phylogenetics and Evolution* **41(1)**: 118–126.

**Outlaw, D.C. & Voelker, G.** (2006b). Phylogenetic tests of hypotheses for the evolution of avian migration: a case study using the Motacillidae. *Auk* **123(2)**: 455–466.

**Päckert, M., Martens, J. & Sun, Y.H.** (2010). Phylogeny of long-tailed tits and allies inferred from mitochondrial and nuclear markers (Aves: Passeriformes, Aegithalidae). *Molecular Phylogenetics and Evolution* **55(3)**: 952–967.

**Pasquet, É., Cibois, A., Baillon, F. & Érard, C.** (2002). What are African monarchs (Aves, Passeriformes)? A phylogenetic analysis of mitochondrial genes. *Comptes Rendus Biologies* **325(2)**: 107–118.

**Pasquet, É., Pons, J.M., Fuchs, J., Cruaud, C. & Bretagnolle, V.** (2007). Evolutionary history and biogeography of the drongos (Dicruridae), a tropical Old World clade of corvoid passerines. *Molecular Phylogenetics and Evolution* **45(1)**: 158–167.

**Paton, T.A. & Baker, A.J.** (2006). Sequences from 14 mitochondrial genes provide a well-supported phylogeny of the charadriiform birds congruent with the nuclear RAG-1 tree. *Molecular Phylogenetics and Evolution* **39(3)**: 657–667.

**Payne, R.** (2005). Nestling mouth markings and colors of Old World finches Estrildidae: Mimicry and coevolution of nesting finches and their *Vidua* brood parasites. *Miscellaneous Publications of the Museum of Zoology, University of Michigan* **194**: 1–45.

**Pereira, S.L. & Baker, A.J.** (2004). Vicariant speciation of curassows (Aves, Cracidae): a hypothesis based on mitochondrial DNA phylogeny. *Auk* **121(3)**: 682–694.

**Pereira, S.L. & Baker, A.J.** (2008). DNA evidence for a Paleocene origin of the Alcidae (Aves: Charadriiformes) in the Pacific and multiple dispersals across northern oceans. *Molecular Phylogenetics and Evolution* **46(2)**: 430–445.

**Pereira, S.L. & Baker, A.J.** (2010). The enigmatic monotypic Crab Plover *Dromas ardeola* is closely related to pratincoles and coursers (Aves, Charadriiformes, Glareolidae). *Genetics and Molecular Biology* **33(3)**: 583–586.

**Pereira, S.L., Johnson, K.P., Clayton, D.H. & Baker, A.J.** (2007). Mitochondrial and nuclear DNA sequences support a Cretaceous origin of Columbiformes and a dispersal-driven radiation in the Paleocene. *Systematic Biology* **56(4)**: 656–672.

**Phillips, M.J., Gibb, G.C., Crimp, E.A. & Penny, D.** (2010). Tinamous and moa flock together: mitochondrial genome sequence analysis reveals independent losses of flight among ratites. *Systematic Biology* **59(1)**: 90–107.

**Pons, J.M., Hassanin, A. & Crochet, P.A.** (2005). Phylogenetic relationships within the Laridae (Charadriiformes: Aves) inferred from mitochondrial markers. *Molecular Phylogenetics and Evolution* **37(3)**: 686–699.

**Prum, R.O.** (1993). Phylogeny, biogeography, and evolution of the broadbills (Eurylaimidae) and asities (Philepittidae) based on morphology. *Auk* **110(2)**: 304–324.

**Prum, R.O. & Lanyon, W.E.** (1989). Monophyly and phylogeny of the *Schiffornis* group (Tyrannoidea). *The Condor* **91(2)**: 444–461.

**Raikow, R.J.** (1982). Monophyly of the Passeriformes: test of a phylogenetic hypothesis. *Auk* **99(3)**: 431–445.

**Raikow, R.J. & Bledsoe, A.H.** (2000). Phylogeny and evolution of the passerine birds. *BioScience* **50(6)**: 487–499.

**Raikow, R.J. & Cracraft, J.** (1983). Monophyly of the Piciformes: a reply to Olson. *Auk* **100(1)**: 134–138.

**Reddy, S.** (2008). Systematics and biogeography of the shrike-babblers (*Pteruthius*): species limits, molecular phylogenetics, and diversification patterns across southern Asia. *Molecular Phylogenetics and Evolution* **47(1)**: 54–72.

**Reddy, S. & Cracraft, J.** (2007). Old World shrike-babblers (*Pteruthius*) belong with New World vireos (Vireonidae). *Molecular Phylogenetics and Evolution* **44(3)**: 1352–1357.

**Reddy, S., Driskell, A., Rabosky, D.L., Hackett, S.J. & Schulenberg, T.S.** (2012). Diversification and the adaptive radiation of the vangas of Madagascar. *Proceedings of the Royal Society B: Biological Sciences* **279(1735)**: 2062–2071.

**Remsen, J.V., Jr., Cadena, C.D., Jaramillo, A., Nores, M., Pacheco, J.F., Schulenberg, T.S., Stiles, F.G., Stotz, D.F. & Zimmer, K.J.** (2009) A classification of the bird species of South America. American Ornithologists' Union. http://www.museum.lsu.edu/~Remsen/SACCBaseline.html

**Rice, N.H.** (2005a). Phylogenetic relationships of antpitta genera (Passeriformes: Formicariidae). *Auk* **122(2)**: 673–683.

**Rice, N.H.** (2005b). Further evidence for paraphyly of the Formicariidae (Passeriformes). *The Condor* **107(4)**: 910–915.

**Riesing, M.J., Kruckenhauser, L., Gamauf, A. & Haring, E.** (2003). Molecular phylogeny of the genus *Buteo* (Aves: Accipitridae) based on mitochondrial marker sequences. *Molecular Phylogenetics and Evolution* **27(2)**: 328–342.

**Sangster, G., Alström, P., Forsmark, E. & Olsson, U.** (2010). Multi-locus phylogenetic analysis of Old World chats and flycatchers reveals extensive paraphyly at family, subfamily and genus level (Aves: Muscicapidae). *Molecular Phylogenetics and Evolution* **57(1)**: 380–392.

**Schodde, R. & Christidis, L.** (2014). Relicts from Tertiary Australasia: undescribed families and subfamilies of songbirds (Passeriformes) and their zoogeographic signal. *Zootaxa* **3786**: 501–522.

**Seddon, N., Tobias, J.A. & Butchart, S.H.** (2003). Group living, breeding behaviour and territoriality in the Subdesert Mesite *Monias benschi*. *Ibis* **145(2)**: 277–294.

**Sefc, K.M., Payne, R.B. & Sorenson, M.D.** (2003). Phylogenetic relationships of African sunbird-like warblers: Moho (*Hypergerus atriceps*), Green Hylia (*Hylia prasina*) and Tit-hylia (*Pholidornis rushiae*). *Ostrich* **74(1/2)**: 8–17.

**Seutin, G. & Bermingham, E.** (1997). *Rhodinocichla rosea* Is an Emberizid (Aves; Passeriformes) Based on Mitochondrial DNA Analyses. *Molecular Phylogenetics and Evolution* **8(2)**: 260–274.

**Sheldon, F.H. & Slikas, B.** (1997). Advances in ciconiiform systematics 1976–1996. *Colonial Waterbirds* **20(1)**: 106–114.

**Sheldon, F.H., Whittingham, L.A., Moyle, R.G., Slikas, B. & Winkler, D.W.** (2005). Phylogeny of swallows (Aves: Hirundinidae) estimated from nuclear and mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution* **35(1)**: 254–270.

**Shepherd, L.D. & Lambert, D.M.** (2007). The relationships and origins of the New Zealand wattlebirds (Passeriformes, Callaeatidae) from DNA sequence analyses. *Molecular Phylogenetics and Evolution* **43(2)**: 480–492.

**Shibusawa, M., Nishibori, M., Nishida-Umehara, C., Tsudzuki, M., Masabanda, J., Griffin, D.K. & Matsuda, Y.** (2004). Karyotypic evolution in the Galliformes: an examination of the process of karyotypic evolution by comparison of the molecular cytogenetic findings with the molecular phylogeny. *Cytogenetic and Genome Research* **106(1)**: 111–119.

**Sibley, C.G. & Ahlquist, J.E.** (1990). *Phylogeny and Classification of birds: A Study in Molecular Evolution.* Yale University Press, New Haven, Connecticut.

**Sibley, C.G., Williams, G.R. & Ahlquist, J.E.** (1982). The relationships of the New Zealand wrens (Acanthisittidae) as indicated by DNA-DNA hybridization. *Notornis* **29(2)**: 113–130.

**Siegel-Causey, D.** (1988). Phylogeny of the Phalacrocoracidae. *The Condor* **90(4)**: 885–905.

**Simpson, S.F. & Cracraft, J.** (1981). The phylogenetic relationships of the Piciformes (Class Aves). *Auk* **98(3)**: 481–494.

**Skutch, A.F.** (1946). Life histories of two Panamanian antbirds. *Condor* **48(1)**: 16–28.

**Slager, D.L., Battey, C.J., Bryson, R.W., Jr., Voelker, G. & Klicka, J.** (2014). A multilocus phylogeny of a major New World avian radiation: the Vireonidae. *Molecular Phylogenetics and Evolution* **80**: 95–104.

**Sorenson, M.D. & Payne, R.B.** (2005). A molecular genetic analysis of cuckoo phylogeny. Chapter 5. Pp. 68–94 in: Payne, R.B. ed. (2005). *The Cuckoos.* Oxford University Press, Oxford, UK.

**Sorenson, M.D., Oneal, E., Garcia-Moreno, J. & Mindell, D.P.** (2003). More taxa, more characters: the hoatzin problem is still unresolved. *Molecular Biology and Evolution* **20(9)**: 1484–1498.

**Sorenson, M.D., Balakrishnan, C.N. & Payne, R.B.** (2004). Clade-limited colonization in brood parasitic finches (*Vidua* spp.). *Systematic Biology* **53(1)**: 140–153.

**Spellman, G.M., Cibois, A., Moyle, R.G., Winker, K. & Keith Barker, F.** (2008). Clarifying the systematics of an enigmatic avian lineage: what is a bombycillid? *Molecular Phylogenetics and Evolution* **49(3)**: 1036–1040.

**Steadman, D.W. & Martin, P.S.** (2003). The late Quaternary extinction and future resurrection of birds on Pacific islands. *Earth-Science Reviews* **61(1)**: 133–147.

**Storer, R.W.** (2006). The grebe-flamingo connection: a rebuttal. *Auk* **123(4)**: 1183–1184.

**Suh, A., Paus, M., Kiefmann, M., Churakov, G., Franke, F.A., Brosius, J., Kriegs, J.O. & Schmitz, J.** (2011). Mesozoic retroposons reveal parrots as the closest living relatives of passerine birds. *Nature Communications* **2**: 443.

**Swennen, C., De Bruijn, L.L.M., Duiven, P., Leopold, M.F. & Marteijn, E.C.L.** (1983). Differences in bill form of the oystercatcher *Haematopus ostralegus*; a dynamic adaptation to specific foraging techniques. *Netherlands Journal of Sea Research* **17(1)**: 57–83.

**Swierczewski, E.V. & Raikow, R.J.** (1981). Hind limb morphology, phylogeny, and classification of the Piciformes. *Auk* **98(3)**: 466–480.

**Tavares, E.S., Baker, A.J., Pereira, S.L. & Miyaki, C.Y.** (2006). Phylogenetic relationships and historical biogeography of neotropical parrots (Psittaciformes: Psittacidae: Arini) inferred from mitochondrial and nuclear DNA sequences. *Systematic Biology* **55(3)**: 454–470.

**Tello, J.G., Moyle, R.G., Marchese, D.J. & Cracraft, J.** (2009). Phylogeny and phylogenetic classification of the tyrant flycatchers, cotingas, manakins, and their allies (Aves: Tyrannides). *Cladistics* **25(5)**: 429–467.

**Thomas, G.H., Wills, M.A. & Szekely, T.** (2004). A supertree approach to shorebird phylogeny. *BMC Evolutionary Biology* **4**: 28.

**Treplin, S., Siegert, R., Bleidorn, C., Thompson, H.S., Fotso, R. & Tiedemann, R.** (2008). Molecular phylogeny of songbirds (Aves: Passeriformes) and the relative utility of common nuclear marker loci. *Cladistics* **24(3)**: 328–349.

**van Tuinen, M., Sibley, C.G. & Hedges, S.B.** (1998). Phylogeny and biogeography of ratite birds inferred from DNA sequences of the mitochondrial ribosomal genes. *Molecular Biology and Evolution* **15(4)**: 370–376.

**van Tuinen, M., Butvill, D.B., Kirsch, J.A. & Hedges, S.B.** (2001). Convergence and divergence in the evolution of aquatic birds. *Proceedings of the Royal Society B: Biological Sciences* **268(1474)**: 1345–1350.

**Veron, G. & Winney, B.J.** (2000). Phylogenetic relationships within the turacos (Musophagidae). *Ibis* **142(3)**: 446–456.

**Voelker G. & Spellman, G.M.** (2004). Nuclear and mitochondrial DNA evidence of polyphyly in the avian superfamily Muscicapoidea. *Molecular Phylogenetics and Evolution* **30**: 386–394.

**Wang, N., Braun, E.L. & Kimball, R.T.** (2012). Testing hypotheses about the sister group of the passeriformes using an independent 30-locus data set. *Molecular Biology and Evolution* **29(2)**: 737–750.

**Wang, N., Kimball, R.T., Braun, E.L., Liang, B. & Zhang, Z.** (2013). Assessing phylogenetic relationships among galliformes: a multigene phylogeny with expanded taxon sampling in Phasianidae. *PLoS One* **8(5)**: e64312.

**Wink, M., Heidrich, P. & Fentzloff, C.** (1996). A mtDNA phylogeny of sea eagles (genus Haliaeetus) based on nucleotide sequences of the cytochrome b-gene. *Biochemical Systematics and Ecology* **24(7)**: 783–791.

**Wink, M., Sauer-Gürth, H., Heidrich, P., Witt, H.H. & Gwinner, E.** (2002). A molecular phylogeny of stonechats and related turdids. Pp. 22–30 in: Urquhart, E. ed. (2002). *Stonechats: a Guide to the genus* Saxicola. Christopher Helm, London.

**Wink, M., El-Sayed, A.A., Sauer-Gürth, H. & Gonzalez, J.** (2009). Molecular phylogeny of owls (Strigiformes) inferred from DNA sequences of the mitochondrial cytochrome b and the nuclear RAG-1 gene. *Ardea* **97(4)**: 581–591.

**Winkler, D.W. & Sheldon, F.H.** (1993). Evolution of nest construction in swallows (Hirundinidae): a molecular phylogenetic perspective. *Proceedings of the National Academy of Sciences* **90(12)**: 5705–5707.

**Wright, T.F., Schirtzinger, E.E., Matsumoto, T., Eberhard, J.R., Graves, G.R., Sanchez, J.J., Capelli, S., Müller, H., Scharpegge, J., Chambers, G.K. & Fleischer, R.C.** (2008). A multilocus molecular phylogeny of the parrots (Psittaciformes): support for a Gondwanan origin during the cretaceous. *Molecular Biology and Evolution* **25(10)**: 2141–2156.

**Yamagishi, S., Honda, M., Eguchi, K. & Thorstrom, R.** (2001). Extreme endemic radiation of the Malagasy vangas (Aves: Passeriformes). *Journal of Molecular Evolution* **53(1)**: 39–46.

**Yang, S.J., Fei, F.M. & Yin, Z.H.** (2006). Molecular phylogeny of rosefinches and rose bunting (Passeriformes, Fringillidae, Urocynchramidae). 動物分類學報 *(Acta Zootaxonomica Sinica)* **31(3)**: 453–458.

**Yang, R., Wu, X., Yan, P., Su, X. & Yang, B.** (2010). Complete mitochondrial genome of *Otis tarda* (Gruiformes: Otididae) and phylogeny of Gruiformes inferred from mitochondrial DNA sequences. *Molecular Biology Reports* **37(7)**: 3057–3066.

**Yuri, T. & Mindell, D.P.** (2002). Molecular phylogenetic analysis of Fringillidae, "New World nine-primaried oscines"(Aves: Passeriformes). *Molecular Phylogenetics and Evolution* **23(2)**: 229–243.

**Zuccon, D. & Ericson, P.G.P.** (2010). A multi-gene phylogeny disentangles the chat-flycatcher complex (Aves: Muscicapidae). *Zoologica Scripta* **39(3)**: 213–224.

**Zuccon, D. & Ericson, P.G.** (2012). Molecular and morphological evidences place the extinct New Zealand endemic *Turnagra capensis* in the Oriolidae. *Molecular Phylogenetics and Evolution* **62(1)**: 414–426.

**Zuccon, D., Cibois, A., Pasquet, E. & Ericson, P.G.** (2006). Nuclear and mitochondrial sequence data reveal the major lineages of starlings, mynas and related taxa. *Molecular Phylogenetics and Evolution* **41(2)**: 333–344.

**Zuccon, D., Prys-Jones, R., Rasmussen, P.C. & Ericson, P.G.** (2012). The phylogenetic relationships and generic limits of finches (Fringillidae). *Molecular Phylogenetics and Evolution* **62(2)**: 581–596.

# Glossary

**aftershaft** — a secondary vaned feather arising from the base of the shaft of a contour feather, and usually smaller with shorter inter-barb intervals than the main feather

**allozyme** — one of several variants of a protein that exist in a population of animals of the same species; early molecular systematics explored relationships by comparing the frequencies of different allozymes across taxa

**altricial** — of birds that hatch with very little if any down, closed eyes, no powers of thermoregulation, and very limited cognitive or motor abilities with no chance of locomotion

**anisodactyl** — having three toes facing forward and one toe facing back

**apteria** — unfeathered regions of the skin, contrasting with the well-delineated regions of the skin bearing feather tracts of dense feather follicles

**arthropods** — invertebrates with jointed legs, such as insects and crustaceans

**brood parasite** — a bird that lays its eggs in the nest of another bird, counting on the parents at the host nest to provide all parental care that the brood parasite's young will ever receive

**brood patch** — that part of the breast and belly that seasonally loses feathers and becomes swollen with retained body water to improve heat transfer to the developing eggs during incubation

**caruncle** — a fleshy, unfeathered, often brightly colored flap or projection of skin about the face

**casque** — a horn-like crest that develops on the culmen, spongy in texture and generally much lighter than it appears

**cere** — an unfeathered and often brightly colored and waxy area at the base of the bill that usually extends around the nostrils and up into the area between the eyes

**clade** — a monophyletic collection of taxa; the group that includes an ancestor taxon and all its descendant taxa

**clutch** — the collection of eggs laid by a female bird in one periodic and uninterrupted series

**comb** — an erect caruncle on top of the head or over the eyes

**commissure** — the region where two bones come together in a joint, in birds often used for the region where maxilla and mandible meet (i.e., where the upper and lower bills come together at the sides of the mouth)

**congener** (adj. **congeneric**) — a species that is in the same genus as another

**contour feather** — a vaned feather forming the outer stream-lined contour of the feather coat of a bird's body (i.e., any vaned feather that is not one of the flight feathers – remiges or rectrices)

**convergent evolution** (or **convergence**) — a similarity between two distantly related organisms, which arose independently and distinctly but became more similar over evolutionary time, not through common descent but presumably most often in response to common selective pressures in similar environments

**cooperative breeding** — a mating and social system in which birds other than the male and female associated with a nest contribute to the parental care at that nest

**coverts** — short, vaned (as opposed to downy) feathers that cover the bases of the remiges or rectrices

**crèche** — a communal nursery where chicks are cared for, usually with the parent returning at intervals and finding and feeding its own offspring in the assembled mass of young birds

**crop** — a thin-walled portion of the esophagus that can expand to store food

**crest** — a tuft of feathers on the head that are longer than surrounding feathers; some crests are erectile and can be used as a signal in communication

**cryptic** (n. **crypsis**) — serving to conceal a bird by matching its plumage or behavior to its environment

**culmen** — the dorsal edge of the upper bill, from the tip to the feathering at its base

**decurved** — of bills that curve downward from base to tip

**dichromatic** (n. **dichromatism**) — having two distinct color forms, the most common being sexual dichromatism

**dimorphic** (n. **dimorphism**) — occurring in two different forms, the most common being differences in size, shape or plumage between the sexes

**distal** — away from the center of the body, as opposed to proximal

**DNA sequence** — the sequence of DNA codons as they are arrayed on a chromosome. This sequence determines the sequence by which molecular building blocks are put together to produce a protein or other biological molecule and thus determines the way that that molecule can function. Some areas in large biological molecules are more important to their function than others, and some parts of DNA are never even read for inclusion of their information into biological molecules; thus, in a given gene, variation in some DNA is strongly selected upon while variation in other regions of the gene is invisible to selection and adaptively neutral

**DNA-DNA hybridization** — a method used early in molecular avian phylogenetics to assess the overall genetic differences between two species by forming a hybrid double helix from single strands of DNA from each species, then measuring the temperature at which this double strand separates into single strands again; the lower the temperature required to shake them apart, the greater the difference between the species

**endemic** (n. **endemism**) — having a distribution restricted to a given region. Any taxon of any size can be endemic to any region of any size: species are often endemic to a given state or island but genera or families are much less commonly so

**facultative** — capable of flexible expression of a particular behavioral pattern; e.g., in species that are facultative brood parasites, some members may be brood parasites and others may not, depending on circumstances

**fauna** — the totality of animal species living in a designated area and time

**fenestra** (pl. **fenestrae**) — an opening or "window" in a flattened bone, as in the incised posterior margin of the sterna of tinamous

**flight feathers** — the vaned feathers of the wing and tail that generate aerodynamic forces during flight

**fovea** (pl. **foveae**) — the indentation of a retina populated by increased density of photoreceptor cells, producing an area of exceptionally high resolution in the image field

**frontal spike** — a horny extension from the top and front of the skull

**frugivorous** — having a diet made up in large part or entirely of fruit

**furcula** — the U-shaped bone attached to the junction of the humerus, coracoid, and sternum on either side, and crossing the mid-line of the sternum (and sometimes attaching to the sternal keel). Homologous with fused clavicles in other tetrapods, this is the bone called the wishbone in poultry in some English-speaking cultures

**fusiform** — having a shape tapered at both ends

**gape** — the breadth of the bill and mouth cavity at the commissure of the bill; also, used for the often-brightly colored and expanded fleshy flanges flanking the jaw-joint externally in young birds

**genus** (pl. **genera**; adj. **generic**) — the taxonomic level just above species and just below family. One genus can potentially include many species, and many genera can be included within a single family

**gonys** — the region where the two halves of the lower jaw (the mandibular rami) come together near the bill tip; the gonys is often expanded and colored in gulls

**gorget** — the dense and ordered feather tracts of hummingbirds in the throat and face that are often highly iridescent in their reflections, with intense reflections of pure colors only at certain angles of the face to the viewer

**graduated** — usually of tails, with the rectrices arrayed in increasing length from outer to innermost pairs, producing a rounded or oval tip when flared

**gular** — pertaining to the throat region, a place of distinctive color, often bare skin, and sometimes important in thermoregulation

**hallux** — the hind toe in birds. Because it is derived from the innermost toe in flat-footed ancestors, it is given the numeral I in designations of comparative anatomy (like the big toe of humans)

**heterodactyl** — having two toes facing forward and two toes facing backward. In terms of homologous toes in other tetrapods, it is the third and fourth toes that face forward and the first (the hallux) and the second that face backward in heterodactyl feet, which are limited to the Trogonidae

**honeydew** — the sugary fluid secreted from the anus by some phloem-feeding insects and fed upon by birds

**infraorder** — a taxonomic level between the suborder and parvorder, which has names ending in the suffix -ides: this term is used by other ornithologists but not in this volume

**kleptoparasitism** (adj. **kleptoparasitic**) — stealing prey from other foraging birds, piratic behavior that is often concentrated around colonies of seabirds

**lamellae** — comb-like ridges on the inner surfaces of both the upper and lower bills of filter-feeding birds (e.g., flamingos, and some ducks and prions), forming a very dense filter when the bill is partly closed for retrieving prey from imbibed water

**lek** — a gathering of males of the same species, in which they display with stereotyped behaviors that appear to allow prospective female mates to evaluate multiple males in a short time

**lerp** — sugary and cottony protective covering of the larvae of psyllid insects, eaten by many nectarivorous birds in Australasia

**loral** — referring to the lores, the region between the eyes and the base of the bill

**malar** — pertaining to the side of the cheek, especially the region between the bill base and the side of the throat patch

**manna** — congealed and dried droplets of sugary sap produced by Eucalyptus trees on leaves and bark as a response to insect herbivory. These droplets eventually fall to the ground and are eaten there or on the tree that produces them by nectarivorous birds in Australasia

**mandible** — the bone forming the lower jaw. NB: there is no such thing as an upper mandible; that bone is called the maxilla

**manus** — the hand, most often used in birds to refer collectively to the bones of the distal fore-limb, which articulate directly or indirectly with the radius and ulna

**mitochondrial DNA** — DNA found in the mitochondria of all birds (and all multicellular organisms). Mitochondria are descended from single-cell organisms that were symbiotically incorporated into the cells of eukaryotes many hundreds of millions of years ago. They are replicated within eukaryote cells whenever they divide, but, because the size of this genome is relatively small, and because mitochondria are almost never inherited from the father, mitochondrial DNA evolves faster than does nuclear DNA

**monogamous** — having only a single mate at one time. Given the high rate of cryptic extra-pair fertilizations now known to occur in most birds, ornithologists often distinguish between social monogamy (two members of a pair of birds having only each other as apparent mates) and genetic monogamy (all offspring being cared for in the nest having been fathered by the social mate)

**monomorphic** — occurring in only one form; most often used to refer to sexual monomorphism, in which males and females are not distinctly different in plumage or size

**monophyletic** (n. **monophyly**) — of a systematic grouping of organisms that includes the common ancestor and all its descendants

**monotypic** — a taxonomic category that has no subdivisions, used most commonly to refer to monotypic genera or families that contain a single species

**nares** (singular, **naris**) — the external nostrils of a bird; the nares are sometimes accompanied by flaps or tubes, which have been of considerable interest to systematists

**natural selection** — the simple and unifying notion of biology that heritable variants in a population that are associated with greater reproductive output will become more common in the population, eventually resulting in changes in gene frequencies in the population and adaptive changes of the phenotypes

**nuclear DNA** — the DNA included in the chromosomes in the nucleus of a cell. Nuclear DNA is generally much larger and more complex than mitochondrial DNA (see for comparison)

**obligate** (adj) — restricted to a particular behavioral pattern, e.g., in a given species of obligate brood parasites, all members of the species pursue the same strategy (compare with facultative)

**oscine** — belonging to the enormous group of passerine songbirds that have more than three pairs of intrinsic muscles in the syrinx and more flexible singing behavior. From oscen, Latin for "singing bird"

**ovoid** — having the shape of a hen's egg

**pamprodactyl** — having feet in which the innermost and outermost toes are capable of rotating forward, thus allowing the bird to hang onto, rather than perch atop, steep substrate. Found in swifts in the Apodini and mousebirds

**paraphyletic** (n. **paraphyly**) — of a systematic grouping of organisms that does not include all the descendants of a common ancestor

**parvorder** — a taxonomic level between the superfamily and infraorder, having a name ending in the suffix -ida

**pectinate claw** — bearing small comb-like ridges perpendicular to the long axis of the claw

**pelagic** — living largely on the open ocean, often over deep waters beyond the continental shelf

**perforate nostrils** — those that have no septum between the nostrils, allowing one to see right through the bill from the side

**phylogeny** — a hierarchical representation, often in the form of a tree, capturing the hypothesized ancestor-descendant relationships in a clade. Phylogenetics is the practice of constructing phylogenies from data on the characteristics of organisms in a clade

**playa** – a flat, intermittently dry area in a desert basin, where runoff sometimes creates a lake then dries to flats, often salty

**pneumatized** — of bones, having a great deal of air in the bone, supported by a fine network of bubble-like, frothy bone

**polyandrous** — of the mating system in birds in which single females mate with and lay eggs fathered by multiple males, which take a large or exclusive role in parental care. A distinction is often made between simultaneous and sequential polyandry, the latter often used when a female lays a clutch with one male, then abandons that clutch to be cared for by the first male and lays another clutch with a second male, who generally has fathered the young that he cares for there

**polygamous** — having more than one mate in a given breeding season

**polygynandrous** — of the mating system in which both males and females have multiple mates in a given breeding season

**polytomy** — a point in a phylogeny in which more than two taxa branch off at the same point: the branching that produced all the descendant taxa happened too rapidly to produce branches of any detectable length between them

**powderdown** — down feathers with barbules that slowly and continuously disintegrate into a very fine powder that is preened into other feathers and may make them resistant to infection and water. Powderdown is found in relatively few species, but is widely distributed across species in at least the following families: Tinamidae, Ardeidae, Leptosomidae, Psittacidae, Cotingidae, and Artamidae

**precocial** — of birds that hatch with a well-developed coat of down, eyes open, substantial powers of thermoregulation, and considerable cognitive and motor abilities, with the chance, depending on their ecological and parental environments, of leaving the nest soon after hatching

**proximal** — closer to the center of the body, as opposed to distal

**racket** — in birds, the spoon-shaped tip of a tail or wing feather, usually just distal of a section of the feather shaft with highly reduced or absent barbs

**raptor** (adj. **raptorial**) — a bird that routinely takes live terrestrial vertebrate prey. Although the term is often limited to accipitrids, it is also often applied to falconids, less often to strigids. Raptors typically have sharp, tearing bills and very strong feet with strongly curved claws

**ratite** — a bird in the Struthioniformes that lacks a keel on its sternum; from ratis, Latin for "raft"

**rectrices** (singular, **rectrix**) — the vaned feathers of a bird's tail that attach to the fused tail vertebrae; the flight feathers of the tail

**recurved** — describing a bill shape with a concave-upward curvature, such that the bill-tip on a standing bird may be higher than its base

**remiges** (singular, **remex**) — the vaned feathers of the wing that attach to the bones of the manus, ulna, and humerus; the flight feathers of the wing

**rictal bristle** — a feather without barbs or barbules, thus a bare-shaft "bristle," that arises in the region around the commissure of the upper and lower bills

**sally** — a short flight from a perch in pursuit of prey, usually by a bird that returrns quickly to the same perch

**scute** — a scale, usually shield-shaped, on the leg or toe of a bird, most often in a single row on the front of the tarsus, all along its length

**secondary feathers** — the remiges that attach to the ulna of the wing

***sensu lato*** — from Latin, meaning "in a broad sense." Usually applied to taxonomic groups. Thus, Sylviidae *sensu lato* refers to the broader definition of Sylviidae, which included many more families before recent molecular work clarified the many monophyletic clades within that large group that have now been assigned to new more narrowly defined and focused families

**serrate** — bearing tooth-like notches and inclined planes along the tomium of a bill

**sexual selection** — a variant of natural selection in which selection acts on variation in mating success rather than offspring number and survival. Sexual selection can produce mating adaptations, such as extreme tails or behaviors, that produce many more matings, but potentially at the cost of reduced survival of the displaying bird

**sibilant** — of sounds that have a hissing, high-pitched quality

**sister group** — that group to which another group is most closely related

**syndactyl** — having toes fused together for at least some of their length

**tarsus** (plural **tarsi**) — the first skeletal element above the feet of birds, consisting of the fused bones of the tarso-metatarsus, which are homologous to proximal foot bones in other tetrapods

**tertials** — the flight feathers on a wing that are closest to the body; variable in number and often less uniform in overall outline than the other secondaries (which attach to the ulna), they sometimes attach to the proximal ulna and sometimes to the humerus (at least in Diomedeidae), but most have no attachment to the wing bones and probably play a role more in streamlining and protecting the remiges rather than generating lift. Those that attach to the ulna probably better considered inner secondaries of distinctive form

**tomium** (adj. **tomial**) — the cutting edge of the bill

**torpor** (adj. **torpid**) — a state of reduced cognitive responsiveness and lowered metabolic activity occasioned by the down-regulation of body temperature to a level considerably lower than normal. Unlike hibernation in mammals, torpor is never a long-term energy management strategy in birds

**totipalmate** — having all digits in the foot connected, in series, by webbing

**truncate** — with all the rectrices ending at or near the same point, producing an abruptly square or very slightly rounded tail-end; contrast with graduated tail

**uncinate process** — a flange-like projection of the ribs in most birds that extends posteriorly from each rib and overlaps slightly with the rib behind it in the rib cage

**wattle** — an unfeathered fleshy lobe on the face or neck, most often brightly colored

**xeric** — of arid habitats

**zygodactyl** — having two toes facing forward and two toes facing backward. In terms of homologous toes in other tetrapods, it is the second and third toes that face forward and the first (the hallux) and the fourth that face backward. This arrangement occurs in cuculiforms as well as in most piciform birds and, facultatively, in many strigiform birds

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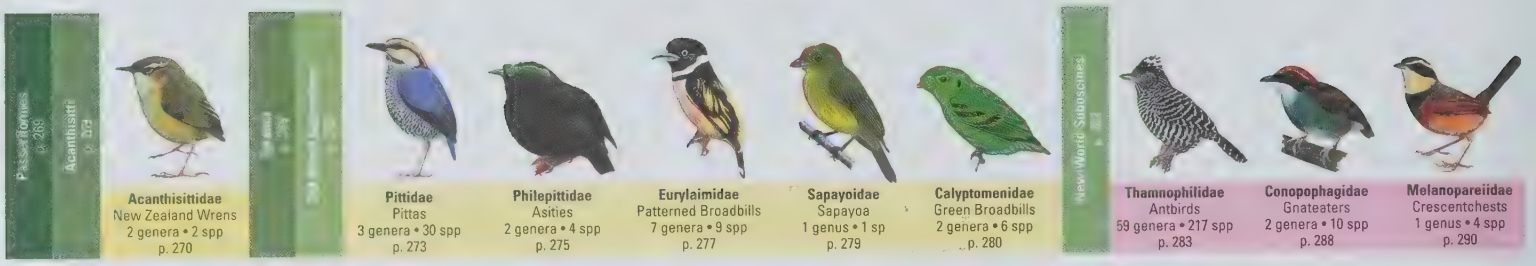
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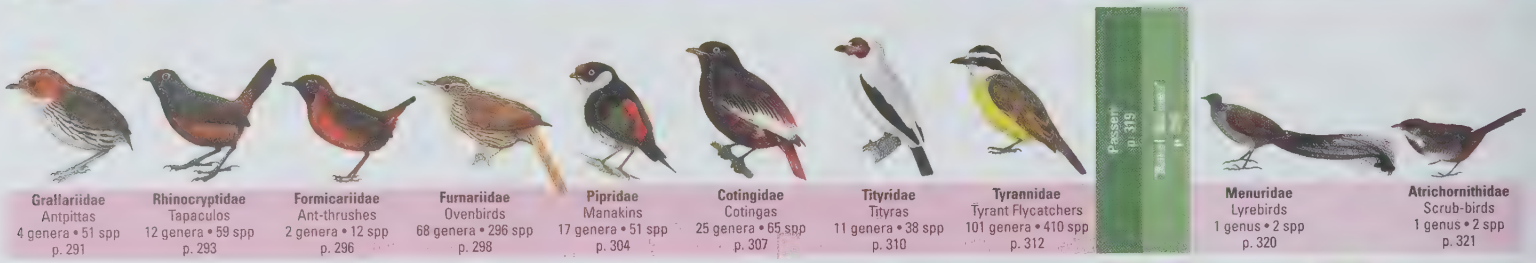
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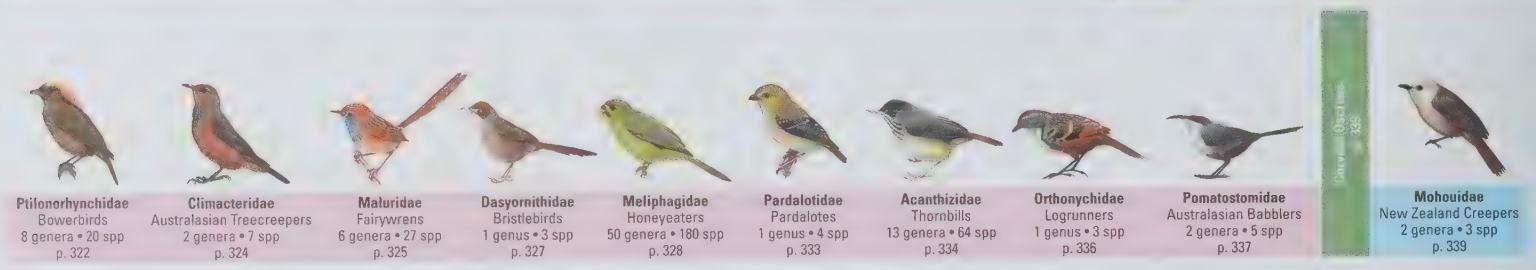
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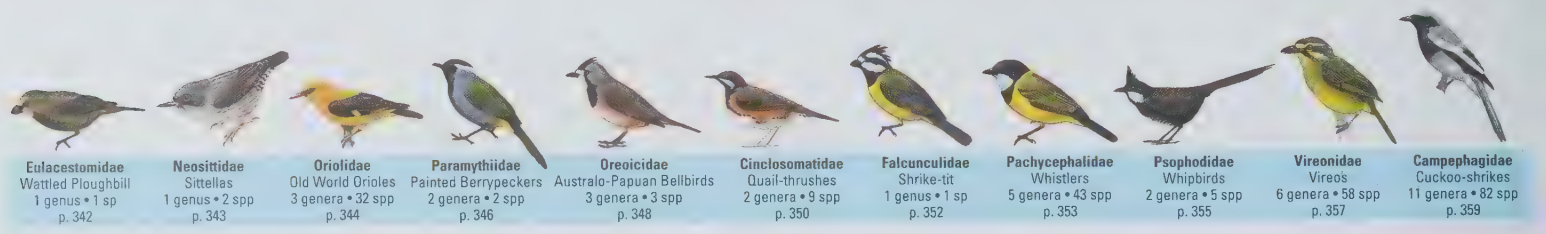
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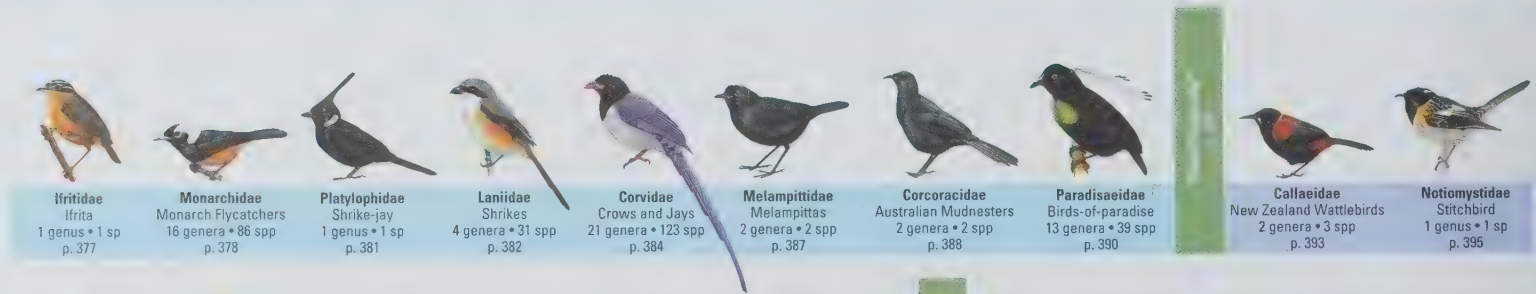
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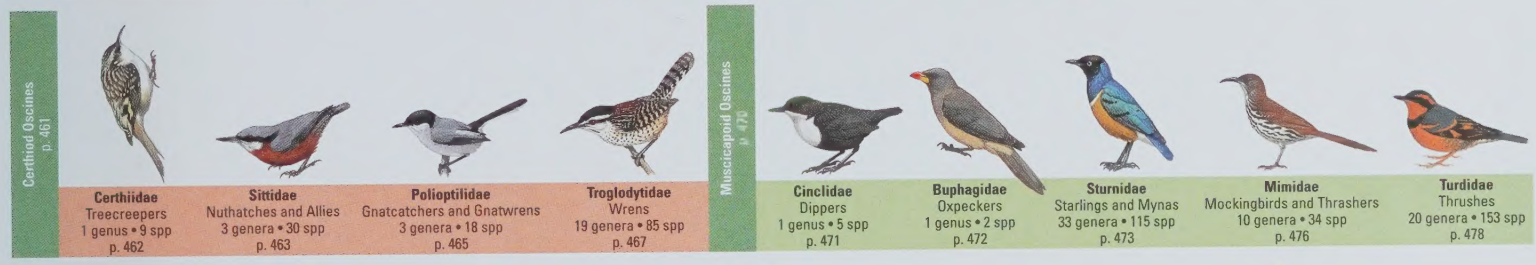
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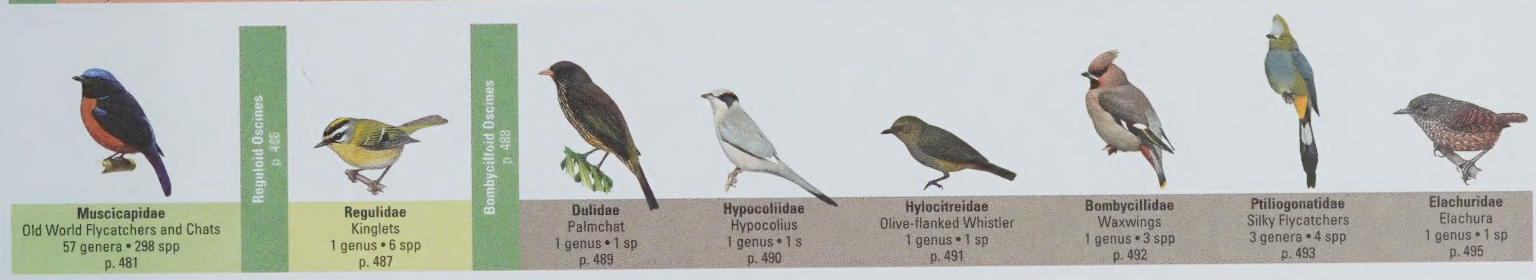
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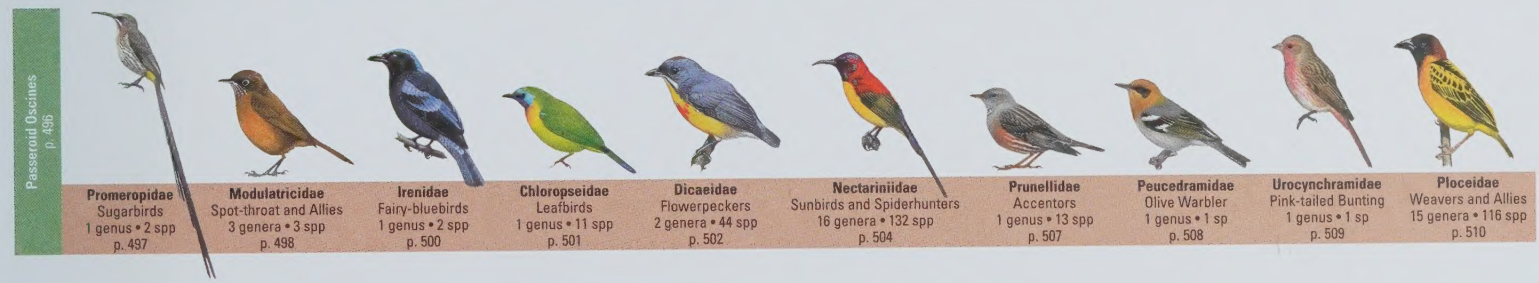
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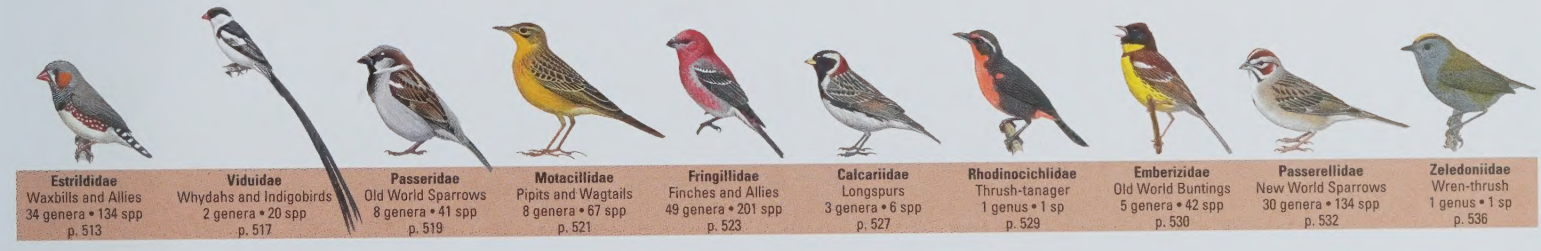
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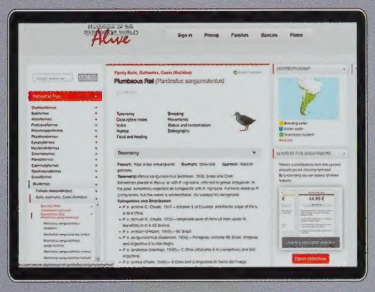


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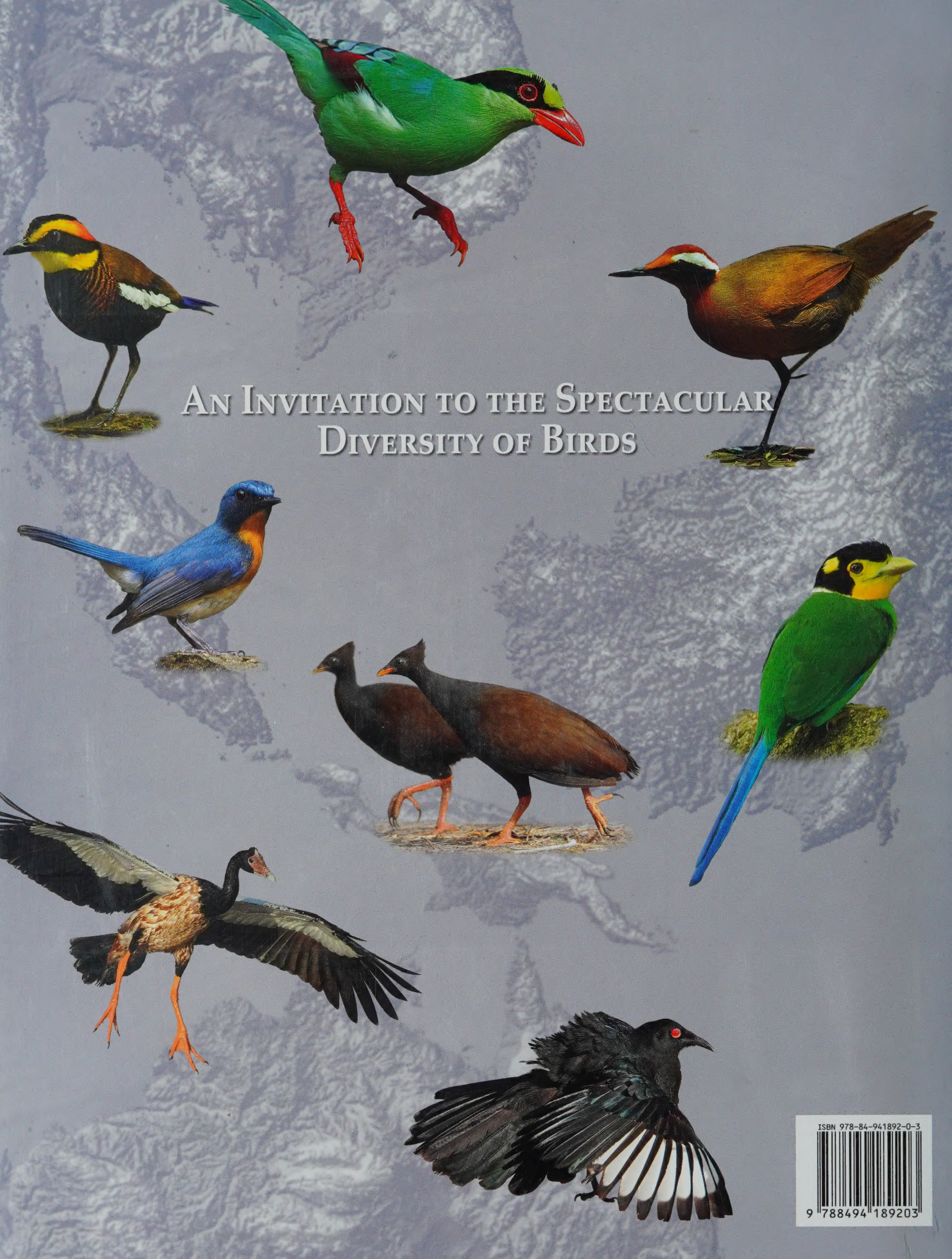
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